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CLARKE (H. R.). **Saving a million crossties a year.**—*Rly Engng Maint.*, *1935*, 2, pp. 76–78, 90–91, 2 figs., 1935.

The first treated sleepers on the Chicago, Burlington, and Quincy Railway in 1899 received ½lb. zinc chloride per cu. ft. of wood (Burnettizing process). Since 1902 a certain number of the treated sleepers were done by the Card process (½ lb. zinc chloride and 3 lb. creosote per cu. ft.) [*R.A.M.*, xii, p. 670]. From 1908 the latter process was more extensively used, while a limited number of the southern pine [*Pinus palustris*] sleepers have been preserved with Grade 1 creosote to a net absorption of 5 lb. per cu. ft. Besides these sleepers treated at company-owned plants, some 7,400,000 impregnated by the Card and Burnettizing processes at commercial installations have been utilized on the railway, making a total since 1899 of about 61,650,000 treated sleepers. In a general way the use of the Burnettizing method is indicated in the semi-arid territories west of the Missouri river and that of the Card in the areas of heavier rainfall to the east. These processes were used until 1930 when a change to the Rueping method—50 per cent. creosote and 50 per cent. petroleum, with a retention of 8 lb. per cu. ft. of wood [ibid., xiv, p. 205]—was considered to be economically justifiable in the confident expectation of obtaining a service life for the sleepers of 25 years in comparison with the 18½ year record hitherto established at an annual saving per sleeper of $0·0270 [ibid., xi, p. 685].

BADE (O.) & KLEM (P.). **Sopp i tremasse.** [Fungi in ground wood-pulp.]—*Papirjournalen*, xxiii, 4, pp. 39–44; 5, pp. 47–49, 6 figs., 1 graph, 1935.

These two papers with the same title deal from a technical standpoint with the various pulp-grinding systems used in Scandinavian paper factories in relation to the problem of fungal infection [primarily by the blue-staining organisms, *Ceratostomella* or *Ophiostoma* spp., *Cadophora fastigiata*, *Lecythophora lignicola*, *Pullularia pullulans*, *Trichosporium heteromorphum*, &c.: *R.A.M.*, xiv, pp. 140, 274].

KUPKE (W.). **Versuche mit der Ceresan-Nassbeize im Gemüsebau.** [Experiments with ceresan liquid disinfectant in vegetable cultivation.] —*Nachr. SchädlBekämpf., Leverkusen*, x, 1, pp. 46–50, 1 fig., 1935.

Attention is drawn to the excellent control of club root [*Plasmodiophora brassicae*] of Savoy cabbage (Eisenkopf variety) and Erfurt Dwarf

cauliflower obtained in the Breslau district of Germany in 1932 by two to three treatments with 0·1 to 0·15 per cent. liquid ceresan (U. 564) [*R.A.M.*, xiv, p. 20], the first applied to the soil of the seed-bed at sowing and the last to the seedlings a day or two before transplanting; the latter operation should be followed in six to eight days by a further treatment at 0·1 per cent. At present prices the cost of disinfection of 8,000 plants, covering ¼ hect., amounts to M. 20, exclusive of labour.

De Bruyn (Helena L. G.). **De invloed van bemesting op de aantasting door Peronospora parasitica bij Kool.** [The effect of manure on the infection of Cabbage by *Peronospora parasitica*.]—*Tijdschr. PlZiekt.*, xli, 3, pp. 57–64, 1 pl., 1935. [English summary.]

Experiments were carried out to attempt to reconcile the conflicting results obtained by Quanjer in Holland and Chupp in the United States with regard to the effect of manuring on the infection of cabbage by *Peronospora parasitica* [*R.A.M.*, ix, p. 695].

The variations in physiological characters between the eleven strains of the fungus used were negligible when they were grown in monoconidial cultures on sterile seedlings, except for the sexual differences already reported [ibid., xiv, p. 415]. Light was found to exert a significant effect on the incidence of infection resulting from the inoculation of cabbage seedlings on nutrient agar in sterile glass tubes, susceptibility to the fungus being at a low ebb during the dark winter months and increasing with the lengthening days. The composition of the nutrient solution seemed to be of relatively minor importance, and in further tests on cabbage and cauliflower seedlings grown from seed from differently manured parent plants and also on full-grown differently manured plants no clear-cut differences in reaction to infection by *P. parasitica* were apparent as a result of the manuring. The fungus was found to be capable of attacking chlorotic cotyledons and etiolated leaves and petioles of full-grown cabbage plants throughout the year [ibid., v, p. 643], while green seedlings are infected only with difficulty or not at all during the winter months. Inoculation tests on *Cheiranthus allioni* in tubes were successful only on yellow, dying foliage.

It is concluded from these results that a special equilibrium of substances in the host cells is essential to invasion by *P. parasitica*, the condition of the chlorophyll also being a decisive factor. The effect of manuring is purely secondary. Thus, cabbage plants deprived of potash in a test plot in 1931 showed more dying foliage than those receiving potash, but *P. parasitica* was present in a virulent form on the few wilting leaves of the potash-treated plants. These results, by showing the preponderant influence of factors other than nutritional on the severity of infection, may partially explain the discrepancies in the observations of previous workers.

Gibbs (J. G.) & Brien (R. M.). **The host range of Phoma lingam. Its significance to Swede production in New Zealand.**—*N. Z. J. Agric.*, l, 3, pp. 172–174, 1 fig., 1935.

The authors state that *Phoma lingam* [*R.A.M.*, xiii, p. 487] was isolated in 1934 in New Zealand from a stem canker on a wild turnip

(*Brassica campestris*) plant, and from leaf spots on rape, cabbage, and cauliflower seedlings. Hypodermic inoculations with single-spore cultures of the fungus caused infection on cultivated *Arabis albida* and *Cheiranthus cheiri*, and on *Matthiola incana*, *Raphanus sativus*, *Sisymbrium orientale* and various other weeds or escaped plants. It is pointed out that of the weed hosts, wild turnip alone is common in farm land; the remaining hosts are not likely to be of significance as sources of infection of swedes or turnips, since they are either rare or of limited distribution in the fields, and have not yet been found to be naturally infected by *P. lingam*.

Macleod (D. J.) & Howatt (J. L.). **The control of brown heart in Turnips.**—Abs. in *Sci. Agric.*, xv, 6, p. 435, 1935.

In addition to sodium tetraborate (borax) at the rate of 10 lb. per acre, kelp [ashes of seaweed], farmyard manure, and sulphur at doses of 20 and 40 tons and 1,000 lb. per acre, respectively, gave moderately satisfactory results in the control of brown heart of turnips, stated to be a limiting factor in production, in recent experiments in eastern Canada [*R.A.M.*, xiii, p. 536].

Takimoto (S.). **On the three species of Ascochyta on Pisum sativum.**—*Ann. phytopath. Soc. Japan*, iv, 3–4, pp. 172–177, 3 figs., 1935. [Japanese, with English summary.]

The writer designates as 'blight', 'brown spot', and 'foot rot', respectively, the pea diseases caused in Japan by *Ascochyta pisi*, *Mycosphaerella pinodes*, and *A. pinodella* [*R.A.M.*, xiv, p. 428], of which *M. pinodes* (the only one found in the ascigerous stage on the host or in culture) is the most destructive. *A. pisi* produces on the leaves pale tan, marginate lesions distinct from the purplish-brown, irregular spots caused by the other two species. *A. pinodella* and *M. pinodes* form black lesions on the base of the plants, which is further liable to severe rotting by the former, whereas *A. pisi* does not attack this part.

Yoshii (H.) & Masano (N.). **On the effect of the staled culture solution of Fusarium niveum to the transpiration of Soy Beans; a criticism to Linford's suggestion.**—*Ann. phytopath. Soc. Japan*, iv, 3–4, pp. 137–144, 1 graph, 1935. [Japanese, with English summary.]

Contrary to Linford's results with filtrate of *Fusarium orthoceras* var. *pisi* from peas [*R.A.M.*, xi, p. 85], the writers found that the decrease of transpirational capacity in cut soy-bean plants placed in staled liquid cultures of *F. niveum* [ibid., xiv, p. 420] runs parallel with the progress of wilting.

Petherbridge (F. R.) & Stirrup (H. H.). **Pests and diseases of the Sugar-Beet.**—*Bull. Minist. Agric., London*, 93, v+58 pp., 16 pl., 1 diag., 1935.

In the second part of this bulletin [which in an editorial foreword is stated to be the outcome of the authors' visit during the summer of

1934 to the chief Continental sugar-beet growing areas] Stirrup gives notes on the symptoms, etiology, distribution, and control of the more important European diseases of the sugar beet, including blackleg associated with *Phoma betae*, *Pythium de Baryanum*, and *Aphanomyces levis* [*R.A.M.*, xiv, pp. 209, 281]; 'strangle' or 'girdling' (known as 'fall', in Denmark), due to superficial attacks of *P. betae*, as well as to insects and to certain physiological or mechanical causes; heart rot and dry rot associated with boron deficiency [see below, p. 551]; non-virus types of yellows due to various causes [see next abstract], namely, that caused by an as yet undetermined species of *Pythium* [ibid., xiv, p. 209], that due to manganese deficiency, one-sided yellows, apparently caused by a species of *Fusarium* or of *Verticillium*, and leaf scorch, due to unsuitable soil conditions; downy mildew (*Peronospora schachtii*); powdery mildew (*Microsphaera betae*) [ibid., x, p. 152], which has not yet been recorded on the crop in England; leaf spots associated with *Cercospora beticola*, *Ramularia beticola* [ibid., viii, p. 696], and *Phyllosticta* (*Phoma*) *betae* [ibid., xiii, p. 210]; rust (*Uromyces betae*) [loc. cit.]; violet root rot (*Helicobasidium purpureum*) [loc. cit.]; scab (*Actinomyces* spp.) [ibid. xi, p. 25]; crown gall (*Bacterium tumefaciens*); and root tumour (*Urophlyctis leproides*) [ibid., xii, p. 537]. The disease of young sugar beet plants caused by *Typhula betae* [ibid., v, p. 590] has not yet been recorded in England.

The virus diseases discussed comprise mosaic [ibid., xiv, p. 72], which so far has only been occasionally recorded on sugar beets in England, yellows (for which the name 'virus yellows' is suggested to distinguish from other types of the condition), and crinkle. Virus yellows [ibid., xiv, p. 342] has been known to exist in most European countries (possibly also in England) for some years, and appears to be now becoming much more widespread; its distribution in the field occurs most commonly through the agency of *Aphis fabae*, though other insects may also be implicated. Crinkle is in some respects similar to the American curly top disease of beets. So far it has not been recorded from England, and is apparently confined to certain parts of Poland and to the area in Germany [ibid., ix, p. 153] between Silesia, where it was first observed in 1903, and Anhalt where it appeared in 1916; it does not seem to occur elsewhere in Europe, although Neuwirth has described a virus disease with similar symptoms from Czecho-Slovakia [ibid., vi, p. 10]. The field transmission of the disease is effected by the Tingid insect *Piesma quadrata* [*Zosmenus quadratus*], which also feeds on certain weeds such as *Chenopodium glaucum* and on spinach; on the latter (but not on *C. glaucum*) it produces symptoms of the crinkle type. It was shown by Kaufmann that the larval stages of *Z. quadratus* are unable to transmit the virus, but that adult insects after feeding once on affected beets retain infectivity throughout their life, and are able on emerging from hibernation in the spring to infect the new crop of seedlings with the virus obtained by them from the preceding crop. Local growers state that the disease causes greater losses (up to 60 per cent.) to the crop than all the other diseases and pests put together. It was experimentally shown that it heavily reduces the total sugar yield of the affected beetroots, some actual figures quoted being 8 gm. average total sugar per root in the severely diseased as against 60·3 gm. in the healthy roots.

De Haan (K.) & Roland (G.). **Enquête internationale sur les différents types de maladies de jaunissement et de mosaïque de la Betterave sucrière quant à leurs caractères et leur influence sur la végétation.** [An international inquiry into the different types of yellowing and mosaic diseases of Sugar Beet in respect of their properties and influence on growth.]—*Publ. Inst. belge Amélior. Better.*, iii, 2, pp. 55–67, 1935. [Flemish, German, and English summaries.]

A summary is given of the results, presented at the fifth meeting of the International Institute of Beet Research at Brussels in January, 1935, of an international inquiry, organized by the Belgian and Dutch beet improvement societies, into the symptoms, etiology, economic importance, distribution, and possibilities of combating the various forms of yellowing and mosaic affecting the crop in Belgium and Holland [see preceding abstract].

Much of the information collected has been noticed from time to time in this *Review*, but attention may be drawn to the following points. A distinction is made between the terms 'jaunisse' ('yellow spot') and 'jaunissement' ('yellowing'), the former being reserved for a virus disease of the mosaic type while the latter is applied in a more general sense to physiological chloroses. The manganese deficiency disease, not yet recorded in Belgium, is stated to be responsible for considerable losses among Dutch crops, amounting in some years to 6 or 8 per cent. of the yield [ibid., xiii, p. 675]. Calcareous soils with an abnormally high humus content and heavily limed sandy soils appear to be specially affected. The very prevalent form of yellowing associated with translocation obstruction and starch accumulation [ibid., xiv, p. 209] is reported to have caused losses of 20 to 30 per cent. in Belgium in 1933, while in Holland the yield reduction from this disorder may be 16 per cent. In Holland mosaic has been observed rather more frequently on fodder than on sugar beets; counts in a Belgian varietal reaction plot in 1934 revealed an incidence of 0·3 to 10 per cent. infection. Yellowing due to *Verticillium* and *Fusarium conglutinans* var. *betae* [ibid., x, p. 428], ordinarily of little importance in Holland and Belgium, was common in the latter country at the end of August, 1934, presumably on account of the drought since the symptoms more or less disappeared following rain.

Schmidt (E. W.). **Zur Physiologie und Pathologie des Vergilbens der Zuckerrübenblätter.** [Contribution to the physiology and pathology of the yellowing of Sugar Beet leaves.]—*Z. wirtschaftsgr. Zuckerindustr.* (formerly *Z. Ver. dtsch. Zuckerindustr.*), lxxxv, 3, pp. 200–214, 4 figs., 1935.

This is an expanded account of the writer's investigations in Germany on the various forms of yellowing in sugar beet foliage, a note on which has already been published [*R.A.M.*, xiv, p. 417 and preceding abstracts].

Bennett (C. W.). **Studies on properties of the curly top virus.**—*J. agric. Res.*, l, 3, pp. 211–241, 4 figs., 1 graph, 1935.

Continuing his investigations of the beet curly top virus [*R.A.M.*, xiii, p. 674] the author describes a method devised by him, in view of

the difficulty of obtaining infection with this virus of experimental hosts by mechanical inoculation [ibid., xii, p. 349], for the preparation of viruliferous material less toxic and more acceptable to the leafhopper (*Eutettix tenella*) vector than the juice extracted from affected beets. The phloem content of the beets, which is relatively rich in virus and can be collected in small quantities as natural exudate from the petioles and leaves, and in larger quantities from the cut surface of diseased beetroots [ibid., xiii, p. 675], is acceptable to the leafhopper, and it was also found possible to separate the virus in the ordinary juice from most of the material toxic to or not liked by the vector. The method employed consists in precipitating with 95 per cent. alcohol or acetone the virus contained in diseased beet juice, phloem exudate, or in suspensions of crushed infective leafhoppers, washing once the centrifuged precipitate with 50 per cent. alcohol, drying it, and making up to the original volume of juice with a 5 per cent. sugar solution. The supernatant liquid resulting from centrifugalization of this preparation contains considerable virus and is a favourable food for the leafhopper; it does not, however, contain all the virus present in the dried precipitate, since large amounts of it were obtained from each of several successive washings of precipitate from phloem exudate and from three successive washings of precipitate from beet juice. Experiments showed that the concentration of the virus was considerably greater in the phloem exudate than in beet juice, and somewhat greater than that in the leafhopper. Infection was obtained from 1 in 1,000 dilutions of the phloem exudate in tests in which one artificially fed leafhopper was placed on each plant, and from 1 in 20,000 dilutions from tests in which ten leafhoppers were used.

Studies of the properties of the curly top virus [cf. ibid., xiii, p. 285] indicated that it passes the common filters, such as the Berkefeld V, N, and W, and the Mandler medium and fine grades; its resistance to ageing in a liquid medium depends largely on the medium; in filtered and unfiltered beet leaf juice it was recovered after 7 days, in unfiltered wash of alcoholic precipitate of leaf juice after 14 days, and from filtered wash of this precipitate after 28 days. It remained active for 10 months in dried phloem exudate, 5 months in the alcoholic precipitate of this exudate, 4 months in dried beet tissue, and 6 months in dried beet leafhoppers. It withstood freezing for a period of 18 months and daily alternate freezing and thawing for three weeks in phloem exudate. The thermal point of inactivation lies between 75° and 80° C. No virus was recovered from liquids having a P_H value of 2·9 or lower; it was not inactivated by an alkaline reaction of the medium at least as high as P_H 9·1, and there was evidence that it occurs normally in an alkaline medium in both the plant and the insect vector. Absolute alcohol reduced but did not destroy the activity of the virus in two hours, and acetone had no apparent effect at any concentration; it also exhibits considerable resistance to a number of common disinfectants, such as copper sulphate (1 in 200), bichloride of mercury (1 in 50), formaldehyde (1 in 100), and carbolic acid (1 in 25). The expressed juice from beet and a number of other plant species was shown to be able to cause inactivation of the curly top virus in periods from 30 minutes to more than 14 days, according to the plant but apparently not correlated with its degree of resistance. This would suggest that, if the inactivating

substances in the expressed beet juice are derived directly from the plant, resistance in beet to curly top (the virus of which is believed to be more or less closely restricted to the phloem) [ibid., xiv, p. 487] is probably governed by the degree to which these substances are able to diffuse into the phloem.

Borissevitch (G. F.). О загнивании корней Сахарной Свеклы вызываемом грибком. **Trichoderma koningi Oud.** [Note on the the root rot of the Sugar Beet caused by *Trichoderma koningi* Oud.] —*Научн. Зап. Сахарн. Промышл.* [*Sugar Industry Scient. Notes*], Kieff, xi [Red Ser.], 4–6 (Agron. Ser. 2–3), pp. 81–85, 1934. [English summary. Received June, 1935.]

Preliminary investigations showed that *Trichoderma koningi* [*R.A.M.*, xii, pp. 535, 593, 656; xiv, p. 332] and *T. lignorum* [ibid., xiv, p. 463] are very widespread both in the soil and on rotting sugar beets in silos in the Ukraine, and are also frequently associated with a premature withering and drying-up of mother beet transplants during all stages of development. Further studies indicated that infection with these fungi occurs chiefly at harvest time through mechanical injuries to the roots, as both were incapable of penetrating through the unbroken surface, and that the beet transplants may be infected from the soil after planting. In controlled experiments it was shown that *T. koningi* isolated from decaying roots rotted healthy beetroots much more actively than the strain of the fungus isolated from infected beet seed clusters, and still more so than *Phoma betae*, while *T. lignorum* produced no rot at all after forty days. Artificial inoculation of seed clusters with pure cultures of *T. koningi* only insignificantly increased the percentage of beetroot rot in the resulting seedlings, while inoculation with *P. betae* raised it from 10 (in the controls) to 60 per cent.; this suggests that *T. koningi* is not a factor in the seedling beetroot rot problem [cf. ibid., x, p. 425; xiii, p. 742]. Comparative Russian technical descriptions of *T. koningi* and *T. lignorum* are appended.

Hughes (W.) & Murphy (P. A.). **Crown rot of Sugar Beet a boron deficiency.**—*Nature, Lond.*, cxxxv, 3410, p. 395, 1935.

In a test in which ten sugar beet seedlings were grown in Crone's solution (P_H 6·2 to 6·5) without boron, and a further twenty with the addition of 1 mg. boric acid per l., the former rapidly developed such severe crown rot (without the intervention of *Phoma betae* or any other parasitic fungus) that three were dead and seven seriously diseased after a month, while the latter made normal, vigorous growth [*R.A.M.*, xiv, p. 282]. At this stage boric acid was supplied to the seven diseased plants and withheld from ten of the twenty healthy ones, with the result that the former recovered and the latter developed crown rot. Confirmatory results were obtained in two field experiments in Carlow, where the disease is severe locally, with 12 to 20 lb. borax per acre, the yield and value of the crop being almost doubled in one instance and increased by one-half in the other, and the sugar content raised by 1 to 3 per cent. The economic importance of this treatment is evident from the fact that the beet area of Leinster is affected by the disease to the extent of 30 per cent.

Solunskaya (Mme N. I.). Влияние бора на гниль сердечка Сахарной Свеклы. [Effect of boron on heart rot of Sugar Beet.]—*Научн. Зап. Сахарн. Промышл.* [*Sug. Ind. sci. Notes*], Kieff, xi [Red Ser.], 8–10 (Agron. Ser. 4–5), pp. 77–95, 5 figs., 3 graphs, 1934. [English summary. Received June, 1935.]

A full account is given of laboratory and field experiments from 1931 to 1933, inclusive, in the Ukraine, the results of which confirmed the efficacy of boron in the control of beetroot heart rot [see preceding abstract], and also showed that the presence of sufficient quantities of this element in the soil increases the sugar content of the crop. There was clear evidence that the increase in heart rot noticed by some former workers at higher P_H values (over 7) of the soil [*R.A.M.*, ix, p. 757] may be explained by a more vigorous development of the beet foliage, entailing a higher demand on the part of the plant in boron, since the disease did not develop in slightly alkaline media in the presence of sufficient doses of the element; the view, therefore, that boron is not assimilated by the beet in alkaline soils has no foundation in fact. Increase in soil moisture during the first half of the vegetative period stimulated leaf development and aggravated heart rot, but in some instances recovery of the plants resulted when the soil moisture was increased towards the end of the period.

Of the two beet lines, Kalnik (sugar beet) and Uladovka (fodder beet), which were tested, the former was the more susceptible to heart rot, although it appeared to be lower than the second in its boron requirement and more susceptible to injury from this element, a dose of 150 mg. of which per plant was capable of causing a depression of growth. The investigation also gave some indications that boron may be useful in the control of certain fungal diseases, both in the field and in storage.

Fron (G.). **Sur la désinfection des graines de Betterave.** [On the disinfection of Beetroot seeds.]—*C. R. Acad. Agric. Fr.*, xxi, 10, pp. 427–433, 1935.

Satisfactory control of *Sphaerella tabifica* [more usually known from the imperfect form *Phoma betae*: *R.A.M.*, xiv, p. 282] on beet seed clusters has been obtained by four or five hours' immersion in 1 in 20,000 cryptonol, a commercial preparation of the neutral sulphate of ortho-oxyquinoline $(C_9H_7ON)_2, H_2SO_4$ [*R.A.M.*, xiii, p. 690], followed by twelve hours' drying at 15° to 20° C. before sowing. Owing to the very low concentration at which cryptonol is used the expense of the treatment is negligible, the cost of sufficient material for the disinfection of seed clusters for 1 hect. amounting to barely Fr. 0·25.

Having regard to the stringent French laws against the use in agriculture of substances liable to injure human or animal health, the discovery of an innocuous substitute for germisan (obtainable only under special permit) is of general interest. The whole problem of the laws governing the agricultural use of toxic substances is briefly discussed by E. Saillard (pp. 422–426), who also contributes some comments (pp. 433–434) on Fron's results.

WALKER (J. C.) & LINK (K. P.). **Toxicity of phenolic compounds to certain Onion bulb parasites.**—*Bot. Gaz.*, xcix, 3, pp. 468–484, 1935.

The results of studies on the effect of twenty-one [listed] phenolic compounds on the growth in Czapek's solution of three onion bulb parasites, namely, *Colletotrichum circinans* [*R.A.M.*, xii, p. 672], *Botrytis allii* [ibid., xiv, p. 49], and *Aspergillus niger*, and also on *Gibberella saubinetii*, showed that in the phenol and phenolic acid series toxicity increased with molecular weight in the compounds in which the hydroxyls are arranged in ortho position to one another on the benzol nucleus, the reverse being true in those in which the hydroxyls stand in meta position to one another [cf. ibid., xiii, p. 645]. Phenol, catechol, and salicylic acid retarded the growth of all the fungi tested at dilutions considerably above the concentration inhibiting growth, while others, e.g., guaiacol, veratric acid, vanillic acid, and protocatechuic aldehyde, stimulated growth in dilutions but little over the inhibitive concentration. Although, as a general rule, *C. circinans* was the least and *A. niger* the most tolerant to each compound tested, the four fungi often showed much wider differences in their degree of tolerance to one compound than to another.

These results are interpreted to indicate that many phenolic substances widely distributed in plants exhibit little or no toxicity to certain parasitic organisms, and that therefore the mere presence of such substances in a host plant does not warrant the conclusion that resistance of the latter to a given parasite is conditioned by them [cf. ibid., xiii, p. 63]; this may only be true when a phenolic substance with specific toxicity to a given organism is present in an appropriate concentration in the host.

BREMER (H.). **Lagerschäden bei Zwiebeln.** [Storage injuries to Onions.] —*Kranke Pflanze*, xii, 3, pp. 35–38, 3 figs., 1935.

Popular notes are given on the rots of stored onions in Germany caused by *Botrytis*, *Sclerotium cepivorum*, and the slime ('Rotz') disease [*R.A.M.*, xiii, p. 614], attributable in the writer's opinion to bacterial agency.

WELLMAN (F. L.). **Dissemination of southern Celery-mosaic virus on vegetable crops in Florida.**—*Phytopathology*, xxv, 3, pp. 289–308, 3 figs., 2 diags., 1935.

The disorders induced by southern celery mosaic virus (celery virus 1) [*R.A.M.*, xiv, p. 93] in Florida have been found to spread in a generally characteristic manner in squash, pepper [*Capsicum annuum*], and celery fields, as well as among the weeds *Commelina nudiflora* and *Ambrosia elatior*. In maize the course of dissemination through the field is somewhat atypical.

In celery and similarly affected crops the first symptoms are usually seen on the edge of the field, where weeds or other crop plants constitute a source of infection. The disease spreads inwards through the successive development of small, scattered, coalescent areas that in turn result in further infection and the gradual formation of widely dispersed foci of contamination, perhaps ultimately involving the whole field. In maize

the bulk of infection occurs in young seedlings near the edges of the fields, older plants being free from attack. *Aphis gossypii*, moving from plant to plant or flying across the field, is the principal agent in the spread of the virus, dissemination being more rapid and extensive in the widely spaced squash and pepper crops than in the denser celery plantings, where the movement of the insects is somewhat hampered by the profusion of foliage.

HÜLSENBERG (H.). **Die Bekämpfung des Spargelrostes (Puccinia asparagi DC.) in der Provinz Sachsen.** [The control of Asparagus rust (*Puccinia asparagi* DC.) in the Province of Saxony.]—*Z. PflKrankh.*, xlv, 2, pp. 97–111, 1935.

This is an expanded account of the writer's proposals for the control of asparagus rust (*Puccinia asparagi*) in Saxony, the salient features of which have already been summarized from another source [R.A.M., xiv, p. 489].

AINSWORTH (G. C.). **Mosaic diseases of the Cucumber.**—*Ann. appl. Biol.*, xxii, 1, pp. 55–67, 3 pl., 2 figs., 1935.

In addition to the two cucumber mosaic diseases in England described by the author in a previous communication [*R.A.M.*, xiii, p. 648], namely, mild or ordinary mosaic (for which the standard name green-mottle mosaic of cucumber is suggested) caused by cucumber virus 3, and yellow mosaic (now renamed yellow-mottle mosaic) caused by cucumber virus 1 [cf. ibid., xiv, p. 400], a third, aucuba mosaic (which the author reterms yellow mosaic of cucumber), is caused by cucumber virus 4. The symptoms and virus properties of these three types are briefly described. Cucumber virus 4 has so far been found occurring naturally only on cucumber; it is filterable through Pasteur-Chamberland filters L1 to L7, resists ageing *in vitro* for nine months or longer, survives 80° C. for 10 minutes but is inactivated by 10 minutes' exposure to 90°, and is not inactivated by 50 per cent. alcohol in one hour. It was successfully inoculated into melon, on which is produced symptoms similar to those on cucumber, and into Florida Favourite and Dixie watermelon (*Citrullus vulgaris*) seedlings, causing a yellow mottle of the leaves and slight stunting of the plants. The paper also includes some notes on insect vectors of the diseases and on control measures.

CHAZE (J.) & SARAZIN (A.). **Contribution à l'étude de la môle, maladie du Champignon de couche. Essai de culture et d'infection.** [Contribution to the study of 'môle', a disease of cultivated Mushrooms. Cultural and infection tests.]—*C. R. Acad. Sci., Paris*, cc, 10, pp. 855–857, 1935.

Continuing their studies on the 'môle' [bubble: *R.A.M.*, xiv, p. 490] disease of the cultivated mushroom [*Psalliota campestris*] caused by *Mycogone* [*perniciosa*] and *Verticillium* sp. [ibid., xiv, p. 346], the authors describe experiments the results of which showed that the manurial compost used for the beds is not a suitable medium for growth of the two parasites until after it has been autoclaved. The spores of *M. perniciosa*, in particular, were shown to be killed within two days' sojourn in the mass of fermenting manure at a temperature around 70°C.

while they resisted a temperature of 70° for eight days and of 95° for four hours in a steam bath. When inoculated through wounds into the vigorously growing mushrooms, the *Verticillium* spores germinated fairly well on the surface, but the mycelium did not penetrate deeper; those of *M. perniciosa* appeared to be still less aggressive: only a few spores germinated around severely injured host cells, and in no case could the disease be reproduced by such inoculations under natural conditions; in the laboratory, however, the resistance of the mushrooms to infection was much lower.

These results are considered to indicate that the disease can only start in the underground mycelial strands of the mushrooms, a view which is supported by the fact that germinating spores of the parasites were seen by the authors in infected spawn. There also was evidence that the development of the disease is favoured by environmental factors tending to reduce the vigour of the spawn, such as excessive humidity, poor aeration, and the like; it was experimentally proved that the spores of the parasites germinated and grew well on spawn that had been killed by mechanical means or by alcohol. It is suggested that in mushroom beds the spores which are present on the surface of the earth cover germinate on organic débris decomposed by bacteria and on the spawn filaments of the mushrooms killed by any cause, from which infection then spreads to the living spawn and to the fructifying bodies.

Wood (F. C.). **Note on Xylaria vaporaria.**—*Gdnrs' Chron.*, xcvii, 2518, p. 213, 1935.

At the Darlington nurseries, Worthing, it has been found quite practicable to eradicate *Xylaria vaporaria* from the mushroom [*Psalliota campestris* and *P. arvensis*] beds [*R.A.M.*, xiv, p. 346] by weeding it out, without, as commonly recommended, destroying the entire site. In many parts of the area recently affected (some 300 out of a total bed surface of 2,000 sq. ft.) the small, irregularly flattened, pinkish sclerotia of the fungus, smelling strongly of freshly cut cucumber, could be located lying flush with the surface of the casing soil, while elsewhere its presence could be detected by the odour of the latter. The mycelium of *X. vaporaria* was frequently found running in the compost in the upper layers of the bed, with a vigorous growth of mushroom spawn immediately below it. The former grows through the compost without changing its colour, whereas the latter imparts the white shade familiar to mushroom growers. As soon as the *Xylaria* sclerotia are removed, the bed is gradually filled up by the spawn and mushroom production proceeds normally.

Demolon (A.), Burgevin (H.), & Marcel (M.). **Culture du Champignon de couche sur fumier artificial.** [The cultivation of the edible Mushroom on artificial manure.]—*C. R. Acad. Agric. Fr.*, xxi, 11, pp. 464–468, 1935.

Satisfactory yields of edible mushrooms [*Psalliota campestris* and *P. arvensis*] have been obtained by the writers at Versailles on a substratum consisting of wheat or oat straw with the addition of urea at the rate of 5 kg. per ton [cf. *R.A.M.*, xiv, p. 491]. Under the conditions used,

the humidity of the mass reached about 66 to 68 per cent. with a reaction of P_H 6·5. The technique of preparing the synthetic manure for the beds is briefly indicated. The addition of 350 gm. potassium nitrate per 100 kg. of manure has been found advantageous.

HÉRANGER (S. F.). **Pulvérisations et mouillabilité.** [Spraying and wettability.]—*Rev. Vitic., Paris*, lxxxii, 2115, pp. 21–25; 2116, pp. 37–46; 2117, pp. 56–61; 2118, pp. 72–79; 2119, pp. 90–94; 2120, pp. 105–108; 2121, pp. 117–121, 1 fig., 5 graphs, 1935.

After pointing out the purely empirical nature of the methods hitherto employed for the appreciation of the degree of wettability of spray liquids [*R.A.M.*, xii, p. 138], the author briefly describes an apparatus ('mouillomètre') devised by him, with which he determined under strictly controlled conditions the factors involved in the display by a number of spray preparations of their full wetting capacity (wettability), i.e., the production by them after a certain duration of spraying of a continuous liquid film on the sprayed surface. He showed that of the five factors tested, namely, time (measured in seconds) of spraying, surface tension of the spray liquid, pressure used in the apparatus, size of jet, and distance of the sprayed object from the nozzle, the first alone is decisive in obtaining the desired effect, and that with Bordeaux and Burgundy mixtures without spreaders it required a minimum of six seconds, the addition of a spreader delaying it by fully a second [under conditions presumably comparable with those obtaining in usual spraying practice]. In discussing the theoretical principles embodied in his apparatus, he claims that it allows of determining directly the wetting capacity of a liquid in terms of a unit ('mouillance') of wettability, which he defines as the capacity of a liquid under strictly standardized conditions to form a continuous film over a surface of 1 sq. cm. in 1 second of spraying.

From a practical standpoint he states that his investigations have clearly demonstrated the entire inadequacy of modern spraying apparatus in the control of fungal diseases such as downy mildew [*Plasmopara viticola*] of the vine, since complete protection could only be obtained by spraying all the susceptible surfaces during a minimum of six seconds each, which is many times more than is practically possible. His conclusion is supported by his observations in nature, which showed that even in exceptionally well-treated vineyards only a maximum of 20 per cent. of the susceptible leaf and bunch surfaces were covered by the spray liquid immediately after spraying. High pressures are detrimental to the efficacy of spraying, since they only serve to reduce the wetting capacity of the liquids by too high fragmentation of the droplets, which of themselves have little wetting property and spread only by amalgamation with other droplets. The finer nozzles have the same effect. In his opinion, the whole practice of spraying is based on erroneous principles, and he suggests that new apparatus should be constructed on the principle of the ordinary watering-can rose, distributing the liquid not as a spray but in continuous streamlets the wetting capacity of which is very high. He believes that such apparatus should be both easy of construction and moderate in cost.

ZILLIG (H.). **Ausgestorbene und selten gewordene Rebenfeinde im deutschen Weinbau.** [Extinct and rare Vine pests in German viticulture.]—*Z. PflKrankh.*, xlv, 4, pp. 210–227, 1935.

The writer's observations, extending over a period of more than thirty years, principally in the Moselle vineyards, supplemented by a study of reliable nineteenth-century data, indicate the virtual disappearance from that region of the once formidable anthracnose (*Elsinoe ampelina*) [*R.A.M.*, xii, p. 596]. Particularly heavy damage was caused by this fungus between 1826 and 1841 and again in the 'seventies, and the importance widely attached to the disease in Germany is apparent from text-books and other records of the period. The last occasion on which anthracnose was reported in the Moselle was in 1909, and its decline thenceforward may be attributed to the general introduction about 1910 of systematic control measures against *Plasmopara viticola*. That the Bordeaux treatment has only been partially effective in the case of downy mildew is doubtless due to the capacity of the causal organism for repeated attacks (up to 20) in the course of the summer [ibid., xiii, p. 678], whereas *E. ampelina* can probably infect only once or twice during the same time. Brief notes are given on a few diseases of common occurrence to-day.

LÜSTNER (G.). **Auftreten der Schwarzfäule (Blackrot) der Rebe in Deutschland.** [Occurrence of black rot of the Vine in Germany.]—*NachrBl. dtsch. PflSchDienst*, xv, 3, p. 27, 1935.

A brief account is given of the symptoms, morphology, distribution, and mode of dissemination of black rot of the vine (*Guignardia bidwellii*), which is stated to have been observed for the first time in Germany on Oberlin 595 leaves near Karlsruhe by Ritschl (xiii *Jahresber. Bad. Weinbauinst.*, p. 54, 1933) and was detected on Riesling grape clusters sent from Rüdesheim to the Geisenheim (Rhine) Phytopathological Experiment Station in October, 1934. This North American fungus was first observed in Europe (France) in 1885 and has since been found in the Caucasus, Italy, and Spain.

TRINCHIERI (G.). **Asserzioni gratuite. Il 'black rot' della Vite in Italia?** [Groundless assertions. Vine black rot in Italy?]—*Coltivatore e G. vinic. ital.*, lxxxi, 9, pp. 230–232, 1935.

The author points out that there appears to be no evidence whatever for Lüstner's recent statement [see preceding abstract] that vine black rot (*Guignardia bidwellii*) occurs in Italy. The Italian quarantine law of 1927 [*R.A.M.*, vi, p. 639] forbids the import of cuttings of European and American vines from various countries expressly on account of this disease, the absence of which from Italy is, in point of fact, referred to in many recent Italian works on vine diseases, including the paper by Ferraris [ibid., xiv, p. 491] recording it in Jugo-Slavia, which appeared only about a month before Lüstner's.

MACDONALD (J. A.). **Plant pathology.**—*Scot. J. Agric.*, xviii, 2, pp. 164–167, 1935.

In trials of the reaction of marrow-stem kale [*Brassica oleracea* var. *acephala*] to *Plasmodiophora brassicae* [*R.A.M.*, xiii, pp. 9, 561] seven

varieties, representing distinct strains, together with commercial samples of green and purple marrow-stem kale were tested at the East of Scotland College of Agriculture. Four and a half months after sowing (in naturally infected soil to which was added infected turnip material) infection ranged from 16 per cent. in strain 4 to 28 per cent. in strain 5 and 30 per cent. in the commercial purple kale.

Tests of the effect on wheat germination of seed dusting with excess ceresan and agrosan G [ibid., xiii, pp. 502, 570] demonstrated that treatment with the latter at 3, 6, and 42 times the prescribed rate gave, respectively, 96, 97·25 and 88·5 per cent. germination under laboratory conditions, as compared with 97·25, 97, and 96·25 per cent., respectively, for the untreated control seed; under field conditions the treatments gave 89, 89, and 88·25 per cent. germination, as compared with 91, 90·25, and 90 per cent. for the untreated controls. With ceresan the figures for the laboratory test were 97, 96·75, and 85·25 per cent., and for the field test 89·5, 90, and 45 per cent.

NEILL (J. C.). **Some notes on plant diseases: made during a visit to Great Britain and Europe.**—*N.Z. J. Agric.*, l, 4, pp. 232–234, 1935.

Notes are given on the writer's observations on some plant diseases in Great Britain and on the Continent made during a visit in 1934. Seven of the nine seeding swede crops inspected in Great Britain were found to be attacked by dry rot [*Phoma lingam*: *R.A.M.*, xiv, p. 487], which was further present in all the 25 fodder swede crops examined (9 in northern England and 16 in Scotland), the incidence of infection being generally low but ranging from 80 to 90 per cent. in three crops. A disorder closely allied to that known as 'mottled heart' in New Zealand [ibid., vii, p. 418] appears to be on the increase in Great Britain. In Scotland it is particularly prevalent on the Ayrshire coast under the name of 'roan'. The same condition is reported from Holland, Germany, and Denmark, while the Canadian 'brown heart' (a limiting factor in swede production, experimentally shown to be curable to the extent of 80 per cent. by soil treatment with boron) [see above, p. 547] also appears to be identical. The rapidly extending use of marrow-stem kale (choumoellier) [*Brassica oleracea* var. *acephala*] as a substitute for swedes and turnips in Great Britain may be partially attributable to its resistance to *P. lingam* and club root [*Plasmodiophora brassicae*: see preceding abstract].

All the farmers visited in Scotland and Northern Ireland agreed as to the practical improvement over the older methods of the organic mercury dust treatment of oat seed-grain against leaf-stripe [*Helminthosporium avenae*: ibid., xiii, pp. 89, 365].

Meddelelser fra Statens Forsøgsvirksomhed i Plantekultur. [Notes from the State Agricultural Experimental Station.]—*Tidsskr. Planteavl*, xl, 4, pp. 616–686, 3 figs., 1935.

Among the twenty-five leaflets issued during 1934–5 by the Danish State Agricultural Experiment Station and here reprinted, the following are of phytopathological interest: No. 220 on potato varieties and potato diseases, an amplified version of which has been noticed [*R.A.M.*, xiii, p. 720]; No. 226 on bitter pit of apples [see below, p. 592]; No. 229 on the

winter spraying of fruit trees against common orchard pests and diseases; No. 237 on zonal rot of tulips (by Anna Weber and A. Lund); and No. 239 on spraying and dusting injury in the orchard.

Tulip bulbs affected by zonal rot show a soft, grey discoloration of the shoot bases, the diseased area frequently being separated from the healthy tissues above by a narrow, brown zone. The scales are more or less greyish with a darker grey to brown zone blending into the sound portions. The decay may be unilateral or the whole bulb may be involved. The growth of diseased bulbs may be arrested at various stages, sometimes not until the buds are about to emerge from the leaves. The roots are not generally affected at the commencement of the rot but their growth ceases as soon as the base of the bulb is reached. Among the varieties attacked are Prinz von Österreich, Brilliant Star, Bartigon, La Reine, and William Copland. An undetermined Pythiaceous fungus (not *Phytophthora cryptogea* or *P. erythroseptica*, reported as agents of a somewhat similar condition in England) [ibid., xii, p. 140] was isolated from diseased material and inoculated with positive results by various methods into wounded and unwounded bulbs of different standard varieties. The fungus reduced the germination of white cabbage, watercress, beets, cucumbers, beans [*Phaseolus vulgaris*], and peas sown in infested soil, the maximum number of the three last-named developing under such conditions being 10 compared with 80 per cent. in healthy ground. An organism corresponding with the tulip pathogen was reisolated from the surviving seedlings. Green tomatoes were also attacked, but with difficulty except through wounds. Zonal rot was less generally prevalent in 1934–5 than in the preceding season.

Adam (D. B.). **Summary of plant disease records in South Australia for two years ending 30th June 1934.**—*J. Dep. Agric. S. Aust.*, xxxviii, 8, pp. 939–942, 2 graphs, 1935.

Stunting of wheat and oats, associated with *Rhizoctonia* [*Corticium*] *solani* [*R.A.M.*, xiii, pp. 295], continues to be reported, more especially from the mallee [*Eucalyptus* scrub] areas.

Brown rot (*Sclerotinia fructicola*) [ibid., xiv, p. 43] was recorded on peaches in 1932 (for the first time in South Australia since 1902) and on cherries in 1933. A fungus has been isolated from apricot trees suffering from progressive gummosis, affecting one limb after another and ultimately reaching the butt where the work of destruction is completed. Further studies on the disease are in progress.

Russell (T. A.). **Report of the Plant Pathologist, 1934.**—*Rep. Bd Agric. Bermuda, 1934*, pp. 24–32, 1935.

A severe fruit rot of tomatoes, beginning as a brown bruised area near the stem end and finally involving the whole fruit, was found to be associated with a species of *Phytophthora*, inoculations with which on potato produced the tuber rot typical of *P. infestans*. Conversely, the latter organism from potato caused a fruit rot of tomatoes similar to that observed in nature, so that the disease newly recorded in Bermuda may safely be attributed to *P. infestans* [*R.A.M.*, xiv, p. 405].

A lily disease known as 'twist', characterized by excessive mottling and torsion of the leaves, has been responsible for heavy losses. It has

been tentatively regarded as a form of mosaic [ibid., xi, p. 97; cf. also xiii, p. 379], but the problem is complicated by the apparent soundness of the progeny of bulbs from badly diseased plants.

From sclerotia of *Sclerotinia sclerotiorum* [ibid., xiii, p. 356] kept over the summer on damp greenhouse soil apothecia were obtained on 22nd November, while the fructifications of another lot in a tin of soil exposed to the weather developed six or seven weeks later; none were found in the open, however, before January. The perpetuation of *Antirrhinum* [*majus*] rust [*Puccinia antirrhini*: ibid., xiv, p. 447] would appear to depend on the survival of the mycelium in individual plants through the summer, some evidence of which was obtained.

Beans [*Phaseolus vulgaris*] were attacked, for the first time since 1921, by *Bacterium phaseoli* [ibid., xiv, p. 415].

Carrots at the Agricultural Station were severely damaged in May by blight (*Macrosporium carotae*), reported from Long Island and Massachusetts as a cause of loss during exceptionally rainy summers [ibid., xiv, p. 399].

Sweet peppers [*Capsicum annuum*] were slightly damaged by leaf spot (*Cercospora capsici*) [ibid., xiv, p. 344].

Dark, concentric ring- or target-shaped lesions appeared on *Petunia* [*hybrida*] leaves in March, and the disease, evidently of virus origin [cf. ibid., xiii, p. 477] was transmitted to *A. majus* in which it caused the formation of pale, well-defined rings on the foliage.

Uppal (B. N.). **Appendix K. Summary of work done under the Plant Pathologist to Government, Bombay Presidency, Poona, for the year 1933–34.**—*Rep. Dep. Agric. Bombay*, pp. 174–178, 1935.

During the period under review the D–ix strain of sunn-hemp [*Crotalaria juncea*] selected the previous year at Poona as resistant to *Fusarium* wilt [*F. vasinfectum*: *R.A.M.*, xi, p. 282; xiv, p. 144] maintained its resistance.

The *Alternaria* causing cumin [*Cuminum cyminum*] blight [ibid., xiii, p. 494] remains during the summer in the field on stubble; the spores preserved their viability for at least one and a half months when kept dry, but failed to germinate in an atmosphere of 100 per cent. humidity.

Bouisol and sulsol [ibid., xiii, p. 745] gave better control of fig rust [*Cerotelium fici*: ibid., xiii, p. 494] than Bordeaux mixture or sulphur, besides being non-injurious to the leaves.

When kerol [ibid., xii, pp. 420, 709; xiii, p. 12] was applied against *Sclerotium rolfsii* on potatoes at intervals of 7, 15, and 30 days at dilutions of 1 in 400, 800, and 1,200, at the highest concentration it killed or injured the plants, at the second it killed some but brought about an increased yield over the controls, while at the third it gave very satisfactory results, increasing the yield without causing injury.

Macrophomina phaseoli was isolated from 7 new hosts, making a total of 17 in the Presidency [ibid., xiii, p. 494]. On sorghum the fungus reduces the ear-head to about one-fifth its normal size; the disease was found to be appreciably influenced by soil conditions. The sorghum strain from Mohol Farm produces the pycnidial stage, though the Broach Farm strain does not. Under suitable conditions of soil moisture

and temperature it can kill linseed and cotton at any stage of their growth.

Cotton small leaf disease [?stenosis: ibid., xiv, p. 507] is widespread in the Presidency, where it causes serious damage, though its severity varies from year to year. The important symptoms are leaf dwarfing and sterility. That plants unaffected the first year become badly diseased in the first and second ratoons suggests that small leaf may belong to the virus group of diseases, but it has not yet been experimentally transmitted by insects or grafting.

The powdery mildew with endophytic mycelium on *Dolichos lablab* had much larger conidia and conidiophores than the similar type on other local hosts, including nasturtium and *Trigonella foenum-graecum*; the latter was probably *Oidiopsis taurica* [ibid., xiii, p. 375].

LEACH (R.). **Report of the Mycologist.**—*Rep. Dep. Agric. Nyasald, 1934*, pp. 24–26, 1935.

The collar scorch affecting one-year-old tea plants on the north side only of nursery beds during the cold weather of June was found to be a type of sun scorch, probably resultant on an exceptionally hot, dry May. *Rhizoctonia bataticola* [*R.A.M.*, xii, p. 538] was commonly isolated from the diseased areas, thereby confirming previous observations as to its low degree of pathogenicity, except under specialized conditions, on woody plants in Nyasaland, where the fungus is ordinarily represented by a member of Haigh's C group [*Macrophomina phaseoli*: ibid., xii, p. 727].

A disease of old coffee resembling that attributed by Storey to *Fusarium lateritium* [var. *longum*] in East Africa [ibid., xi, p. 712] was observed for the first time in Nyasaland in 1934. Under local conditions, however, the primary branches of the original stem are affected, whereas in Tanganyika infection is confined to the suckers sprouting from cut-back bushes.

The stem canker, angular leaf spot, and fruit scab and rot of mango, at first believed to be of fungal or bacterial origin but subsequently attributed to an insect [ibid., xiv, p. 14], have now been shown to be due to *Helopeltis bergrothi* [ibid., xiii, p. 327], which is also responsible for a fruit scab of avocado.

Agricultural research in Arizona. Forty-fifth Annual Report for the year ended June 30, 1934.—102 pp., 12 figs., 1 graph, 1934. [Received July, 1935.]

The following items of phytopathological interest, besides those already noticed from other sources, occur in this report. Promising results in the amelioration of citrus chlorosis [*R.A.M.*, xiv, p. 481] have been obtained by injecting ferric citrate through holes in the trunk, while a less rapid and possibly only temporary benefit followed soil applications of ferrous sulphate; the latter and ferric tartrate were also moderately effective as injections.

Several spray treatments were tested during the year against date fruit rot (*Thielaviopsis* [*Ceratostomella*] *paradoxa*) [ibid., xiii, p. 92]. Copper acetate and lime-sulphur are both effective, and very satisfactory results were further obtained with 4–4–50 instant Bordeaux [ibid., xiv,

p. 349] with the addition of ½ lb. per 400 galls of a spreader known as 'fluxit'. Infection by angular leaf spot [*Bacterium malvacearum*: ibid., xi, p. 511; xiv, p. 221] is stated to be generally prevalent and commonly overlooked in young Pima cotton crops, the primary attack on the cotyledons extending to the stems and there initiating the permanent blackarm phase. Severe losses (preventable by delinting the seed with sulphuric acid) [ibid., vii, p. 18] were caused by this disease in the Marana district. The occurrence of 'Waxahachie wilt' [ibid., xiii, p. 508] was reported from Perryville.

Among the shade trees and ornamentals responding with conspicuous success to soil treatment with ammonium sulphate for the control of root rot [*Phymatotrichum omnivorum*: ibid., xiii, p. 639] may be mentioned mulberry, pepper tree [*Schinus molle*], Arizona ash, Japanese and California privet [*Ligustrum ? japonicum* and *L. ovalifolium*], and *Cotoneaster* and *Pyracantha* spp., while *Sterculia* and *Casuarina* also react favourably but less rapidly. New hosts of the fungus include *Poinciana gillesii* [Hook.=*Caesalpinia gillesii* Wall.], *Feijoa sellowiana*, and *Acacia pendula*.

Milo sorghum in the Salt River Valley was attacked by a bacterial streak disease apparently due to *Bact. holcicola* [ibid., ix, p. 774]. The heads were dwarfed and the leaves bore water-soaked, later red streaks some $\frac{1}{12}$ in. wide and several inches long. Hegari, hitherto practically free from disease in Arizona, suffered locally from a stalk rot involving disintegration of the pith and general collapse; minute, black fruiting bodies of an undetermined fungus covered the vascular bundles.

Absolute control of wheat bunt [*Tilletia foetens*] was given by copper oxychloride (United Verde Company, Clarkdale, Arizona) [ibid., xiii, p. 751].

The most serious disease of strawberries in the State is the *Rhizoctonia* root rot [ibid., xiii, p. 785], to which the Missionary variety is highly resistant, in striking contrast to Klondyke and Arizona Everbearing; in the latter the lesions often extend right along the root and are much enlarged on the stolons.

Forty-seventh Annual Report Rhode Island State College Agricultural Experiment Station. Contribution 467.—*Bull. R.I. St. Coll.*, xxxi, 1, pp. 50–94, 1935.

This report contains the following items of phytopathological interest. Sweet corn [maize] showed only a trace of bacterial wilt [*Aplanobacter stewarti*: *R.A.M.*, xiv, p. 503] during 1934, in sharp contrast to the previous season when the crops of some varieties were an almost total failure from this cause.

Excellent control of *Rhizoctonia* brown patch and dollar spot on bent grasses [*Agrostis* spp.: *R.A.M.*, xiv, p. 449] was given by the application to the turf of calo-clor, a commercial preparation consisting of one-third mercuric chloride and two-thirds calomel [mercurous chloride] which also proved effective against pink patch (*Corticium fuciforme*) [ibid., xiii, p. 639], a cause of severe damage to golf greens.

A reduction in the assimilation of carbon dioxide by apple leaves was caused by the application of lime-sulphur sprays against scab (*Venturia inaequalis*). At high concentrations (1 in 8 and 1 in 15) complete burning of the foliage was induced under certain conditions [cf. ibid., xiii, pp. 34,

496, *et passim*]; at 1 in 40 less damage of this kind occurred after treatments at 8 a.m. and 5 and 8 p.m. than at 11 a.m. and 2 p.m. Very severe russeting of the fruit and partial defoliation was caused by Bordeaux 4–4–50 and 3–5–50, while some russeting was liable to follow the use of flotation sulphur and lime-sulphur.

Early and late blights of tomatoes [*Alternaria solani* and *Phytophthora infestans*: ibid., xiii, pp. 42, 195; xiv, p. 535, *et passim*] were controlled to the extent of 90 and 95 per cent., respectively, by fortnightly applications of 2–2–50 Bordeaux mixture throughout the growing season.

Early and late blights of celery [*Cercospora apii* and *Septoria apii*] were almost completely controlled by weekly treatments with 4–4–50 Bordeaux [ibid., x, p. 220].

Damping-off [?*Pythium* and *Rhizoctonia* spp.] was adequately combated in cabbage by seed treatment with trioxo, in pepper [*Capsicum annuum*], tomato, and beet with the same and formo-dust, in spinach with red oxide of copper [ibid., xiv, p. 582] and P–D–7, and in cucumber with red oxide of copper. The increases per acre in spring and autumn spinach from the red oxide of copper treatment were 570 and 596 bushels, respectively, the corresponding figures for P–D–7 being 245 and 518, respectively. Organic mercury compounds induced some stunting of lettuce [cf. ibid., xii, p. 264].

Tisdale (W. B.). **Plant pathology.**—*Rep. Fla agric. Exp. Sta. 1933–4*, pp. 70–80, 2 figs., [1935].

This report contains among many others the following items of phytopathological interest. Inoculation experiments by A. N. Brooks and R. E. Nolen showed that *Rhizoctonia* bud rot of strawberries is favoured by abundant soil moisture and high relative humidity, the presence of much organic matter in the top soil, and average daily mean temperatures under 75° F. The original isolate, which was practically identical morphologically with *Rhizoctonia* [*Corticium*] *solani*, was the only one capable of reproducing the disease, which readily attacks the crown but not the rhizome or roots.

Inoculations by A. N. Brooks of potted strawberry plants in the greenhouse showed that wilt (*Colletotrichum fragariae*) [*R.A.M.*, xii, p. 495] did not develop when the mean daily temperature averaged under 70°; field observations again showed the inadvisability of producing nursery strawberry plants on soil infected with this fungus.

Investigations by A. H. Eddins showed that stem rot (*Sclerotinia sclerotiorum*) [ibid., xi, pp. 652, 670] of white (Irish) potatoes was general throughout the Hastings area, where it sometimes reached epidemic proportions, infecting and killing prematurely up to 50 per cent. of the plants and causing a reduction in yield of 14 per cent. Comparisons of the susceptibility of different potato varieties to *C. solani*, as indicated by lesions on the stems 2 in. below the soil surface six weeks after planting, showed that, in three fields, the Katahdin variety had 0, 0·9, and 1·3 per cent. and the Spaulding Rose variety 5·2, 4·4, and 9·1 per cent. infection, respectively. In two potato-growing localities soil applications of sulphur, followed in the next season by others of finely ground agricultural limestone, practically eliminated bacterial wilt (*Bacterium*

solanacearum) [ibid., xiv, p. 85], and increased the yield of marketable tubers; sulphur or lime alone gave less satisfactory results. The increase in the soil acidity beyond P_H 4·57 brought about by the sulphur probably kills the bacterium, since the disease did not reappear when the soil was brought back to P_H 5·29 and 5·49 by the limestone treatment.

Maize leaf spot (*Diplodia macrospora*) [ibid., xiv, p. 355] usually occurs in low, moist situations, and R. K. Voorhees has demonstrated that infection develops at an average temperature of 85° and 80 per cent. relative humidity. Cross-inoculations showed that species of *Diplodia* from sweet potatoes, citrus, and cotton caused an ear rot of maize similar to that due to *D. frumenti*, the imperfect form of *Physalospora zeicola* [cf. ibid., xii, pp. 366, 552], while they also produced similar rots in oranges, grapefruit, sweet potatoes, cotton bolls, and watermelons.

Approximately ten new hosts have been added by A. S. Rhoads to the list of plants attacked by mushroom root rot (*Clitocybe tabescens*) [ibid., xiv, p. 86], making a total of 92 species now known to be attacked.

W. B. Tisdale and E. West found that a storage temperature of 48° inhibits decay of citrus fruits by *D. natalensis*, but permitted a small percentage of decay by *Phomopsis* [*Diaporthe*] *citri* [ibid., xiv, pp. 96, 453] in 60 days; no decay developed in grapefruit stored for 60 days at 42°, but infection increased rapidly when the fruit was removed to laboratory temperatures. Isolations from surface-sterilized parts of buttons and stems of tree-ripe Valencia oranges and Silver Cluster grapefruit showed that both fungi were already present in the buttons of some of the fruits when picked.

A preliminary survey by W. B. Tisdale showed that a bark disease of Tahiti limes chiefly associated with *Diplodia natalensis* and *Diaporthe citri* was present in all lime-growing areas. In the nursery the site of attack appeared to be determined by thorn punctures or other mechanical injuries; the part above the point of infection died. Perrine lemons were similarly affected. In the grove affected trees may die back from the point where they are cut off soon after transplanting, while after trees have been two to four years in the grove, infection occurs in the trunks, near the ground, and in the crotches of large branches, causing the death of the whole or part of the tree. Infection apparently occurs through cracks in the bark and mechanical injuries. *Diplodia natalensis* is usually present in infections of the trunks and large branches, and *Diaporthe citri* in those of small twigs and young trees.

Everglades Experiment Station.—*Rep. Fla agric. Exp. Sta. 1933–4*, pp. 86–112, 3 figs., 1 graph, [1935].

B. A. Bourne states that ring spot and eye spot of sugar-cane (*Helminthosporium ocellum*) [*R.A.M.*, xiv, p. 531] assumed serious proportions on large areas of commercially grown P.O.J. 2725 and other varieties in Florida. A covering of dead cane leaves provides a prolific source of inoculum during winter, when the temperatures approach the optimum for the development of the fungus (23·5° C.) and heavy dews remain on the leaves for exceptionally long periods. Isolation and inoculation experiments showed that the red rot of the leaf sheath prevalent among certain sugar-cane seedling progenies was due to *Colletotrichum falcatum* [ibid., xiv, p. 469]. The organism was grown in

culture and found to be identical with certain strains from diseased stalk tissue of P.O.J. 2714. Stalk red rot appeared in epidemic form in commercial plantings of this variety, about 30 per cent. loss occurring as rotted stalks. The heavily infected areas are rapidly being replaced with P.O.J. 2725 and other red rot-resistant varieties.

Observations by G. R. Townsend showed that potatoes succumbed to early blight (*Macrosporium* [*Alternaria*] *solani*) two weeks earlier in plots without potash than in those to which it had been supplied; the affected plants showed signs of potash deficiency before any blight lesions appeared. Cabbages grown in soil fertilized with potash are less, and those grown with phosphorus more, subject to downy mildew (*Peronospora parasitica*) than cabbages grown in unfertilized soil [cf. ibid., xiv, p. 546]. Beans [*Phaseolus vulgaris*] were defoliated by bacterial blights [*Bacterium medicaginis* var. *phaseolicola*, *Bact. phaseoli*, *Bact. phaseoli* var. *fuscans*, *Bact. flaccumfaciens*, *Bact. vignae* var. *leguminophila*, and *Bact. viridiflava*: ibid., xii, p. 71] earlier in plots deficient in potash than in those with normal soil.

Suit (R. F.) & Eardley (E. A.). **Secondary tumor formation on herbaceous hosts induced by Pseudomonas tumefaciens Sm. and Town.** —*Sci. Agric.*, xv, 6, pp. 345–357, 2 pl., 1935. [French summary.]

When tomato, *Chrysanthemum frutescens*, and *Bryophyllum calycinum* plants were inoculated with *Pseudomonas* [*Bacterium*] *tumefaciens* [*R.A.M.*, xiv, p. 289] by the broth-culture method (comprising insertion of the cut stem in broth culture for 4 hours, followed by removal of the leaves and setting in sterilized sand), the organism moved rapidly in the xylem, attaining in 4 hours a distance of at least 6 in. in tomato, 3 in. in *B. calycinum*, and 2 in. in *C. frutescens*. The movement down the stem reached 1 in. in 4 hours, the transpiration stream assisting the movement upwards [cf. ibid., vii, p. 431; ix, p. 512; x, p. 166]. The bacterium was isolated from apparently normal internodes of tomato plants 10 weeks after inoculation. Cuttings from tomato plants inoculated 9 weeks previously developed crown gall in 76 per cent. within 3 weeks, showing it is inadvisable to take cuttings from infected plants.

Further evidence of the movement of *Bact. tumefaciens* was afforded by the formation of secondary tumours on broth culture-inoculated tomato plants at a distance of 16 in. from the point of entry and on tobacco at 12 in. With needle inoculations the distance travelled was much less, fewer organisms being introduced. The secondary tumours developed at the cut petioles and also were extruded through the normal tissue.

Broth culture-inoculated tomato cuttings wounded by a cut on the fourth internode after one week, formed tumours at 94 per cent. of the wounds and those wounded after 3 weeks at 45 per cent.; with tobacco the percentage of wounds developing tumours ranged from 57 per cent. on cuttings wounded immediately after inoculation to 5 per cent. on those wounded 35 days after. These and other results indicate that if the bacterium is in the vascular system of a plant, wounds which injure this tissue will probably result in the formation of tumours.

Histological studies [which are described] showed that the movement

of the organism in the xylem vessels was influenced by the number and size of the vessels and the vascular anatomy of the stem.

Secondary tumours resulting from vascular infection may develop in three ways. Firstly, external tumours (resembling those from needle inoculation) arise from wounds which break the vessels and liberate the bacteria. Secondly, internal secondary tumours are formed associated with broken vessels of the protoxylem. Finally, extruding tumours are found on the stem surfaces; apparently the bacteria accumulate in a few of the vessels and induce the formation of a rootlet which forces its way through the cortex and becomes disorganized into a tumour as it appears on the stem surface.

Smith (C. O.). **Crown gall on the Sequoia.**—*Phytopathology*, xxv, 4, pp. 439–440, 1 fig., 1935.

In May 1934, wounded *Sequoia gigantea* and *S. sempervirens* were inoculated at Riverside, California, with a culture of *Pseudomonas* [*Bacterium*] *tumefaciens* isolated from a peach seedling. One typical gall, some ¾ in. in diameter, was observed on *S. gigantea* in September, while a smaller one (⅛ in.) developed in October. Inoculations made later in the summer gave negative results, as also did those on *S. sempervirens*, apart from small enlargements with knot-like excrescences possibly representing incipient galls [cf. *R.A.M.*, xii, p. 405].

Kaden (O. F.). **Der Schnitt des Kakaobaumes und sein besonderer Zweck, die Krankheitsverhütung.** [The shaping of the Cacao tree and its particular object, the prevention of disease.]—*Tropenpflanzer*, xxxvii, 11, pp. 459–469, 4 figs., 7 diags., 1934.

The importance of achieving a correct shape in cacao trees is emphasized with special reference to the value of the 'crown' as a protection against desiccation and the resulting secondary diseases caused, e.g., by *Diplodia* [*Botryodiplodia*] *theobromae*, *Corticium salmonicolor*, and *Cephaleuros mycoidea* [*R.A.M.*, xiii, p. 222], and directions are given for this. Care must be taken to secure evenness of the top even at the cost of sacrificing fruiting branches; the latter should also be lopped when weighed down to the ground by their fruits, which are otherwise liable to infection by *Phytophthora faberi* [*P. palmivora*: cf. next abstract]. Drastic pruning should be carried out annually, but the actual renovation of the crown need not be undertaken more often than every two to three years and should on no account involve the removal of more than one-fifth of the growth. Strict attention must be paid to the cleansing of the trees from excrescences of all kinds, of which the most important are the witches' brooms produced by *Marasmius perniciosus* [ibid., xiv, p. 430]. The spurious witches' brooms associated with *Colletotrichum luxificum* [ibid., xiii, p. 221] are primarily due to adverse climatic factors and are merely unsightly without being dangerous.

The Central and South American practice of growing cacao trees in groups to form large bushes cannot be recommended for the West Indies and still less for West Africa, where it is believed to have been a contributory factor in the 'morte subita' disease [loc. cit.].

The standard shape commonly encountered in West Africa, where the trees are so densely planted that they attain an excessive height

without forming proper crowns, has various drawbacks, including the stimulation of infection by *P. palmivora* through the moisture reserves abundantly present under such conditions.

ALICBUSAN (L. A.). **Beneficial effects on diseased Cacao trees of removing infected parts and disinfecting the wounds.**—*Philipp. Agric.*, xxiii, 10, pp. 891–904, 1 pl., 3 figs., 1935.

The most injurious diseases of cacao in the Philippines are stated to be black rot of the pods, canker of the twigs and branches, and blight of the seedlings, all caused by *Phytophthora palmivora* [*R.A.M.*, xiii, p. 813]. Inoculations with the species of *Diplodia*, *Fusarium*, and *Gloeosporium* frequently associated with the cacao pod rot failed, and these fungi are considered to be saprophytes. In the seedlings, infection by *P. palmivora* starts from the tip and gradually spreads downwards, killing the young and tender leaves and causing the infected parts of the shoot to dry up and harden. In a series of experiments on the control of the disease, the best results were given by pruning off the infected material [cf. preceding abstract], cutting out the cankers, and painting the wounds with Bordeaux paste or lead paint; some improvement in the condition of the trees was effected by pruning alone and by treatment of the wounds with coal tar, formalin or copper sulphate solution, or sapolin paint.

HUMPHREY (H. B.). **Cereal-rust parasitism: its relation to water economy, yield, and quality of the host plant.**—*Trans. roy. Soc. Canada*, Sect. V (Biol. Sci.), Ser. III, xxviii, pp. 153–164, 1934. [Received April, 1935.]

This is a compilation of some important papers describing experiments conducted by the Division of Cereal Crops and Diseases, United States Department of Agriculture, co-operating with the Indiana, Iowa, and Kansas State Agricultural Experiment Stations, on the relationship of cereal rust (*Puccinia* spp.) parasitism to the water economy, yield, and quality of the hosts. The subject is treated under the following headings: recent experiments on the effects of leaf rust of wheat (*P. triticina*) and crown rust of oats (*P. coronata*) [*P. lolii*] on their hosts; effect of leaf rust of wheat on yield of straw, grain, and roots; effect of leaf rust of wheat on the chemical composition of the grain, leaves, and culms; effects of crown rust of oats on yield of straw, grain, and roots; and effect of rust infection on the water economy of the host plant. Reference to most of the recent work has been made from time to time in this *Review*.

PAL (B. P.). **Wheat rusts from the viewpoint of plant breeding.**—*Agric. Live-Stk India*, v, 2, pp. 139–144, 1935.

The importance of breeding wheat varieties resistant to the black, yellow, and brown rusts (*Puccinia graminis tritici*), [*P. glumarum*, and *P. triticina*] is discussed in relation to some outstanding recent researches on this subject, and with particular reference to K. C. Mehta's studies on its possibilities in India [*R.A.M.*, xiii, p. 499].

Vasey (A. J.), Baldwin (J. G.), & Doery (A. C.). **Stem rust at Werribee. Its incidence during 1934.**—*J. Dep. Agric. Vict.*, xxxiii, 4, pp. 185–187, 1 graph, 1935.

After pointing out that at the State Research Farm, Werribee, Victoria, wheat stem rust (*Puccinia graminis tritici*) during the last twenty years has only twice been of economic importance, viz., in 1916 and 1934, the authors state that in October and November of the latter year the local rainfall was 227 per cent. above the average. It was only during the first week of November, however, that high maximum temperature combined with high humidity prevailed, and it was during this period that the main attack of rust occurred.

The effect of the rust on Free Gallipoli wheat was to reduce the average yield per ear and the average weight of 1,000 grains from 0·755 and 41·3 gm. to 0·616 and 32·5 gm., respectively; the average number of grains per ear remained normal, but the crop was thicker than usual, and the yield per acre was 25·4 as against an average of 24·9 bushels for the previous eight years. Had the weight of grain been equal to that of 1933, which might reasonably have been expected since the rainfall was adequate, the yield would have amounted to 38·4 bushels per acre, and the loss in yield due to rust, therefore, is calculated as at least 13 bushels per acre. There was even a greater reduction in yield in the varieties flowering during the period of maximum infection.

Lehmann (E.) & Kummer (H.). **Schwarzrostbekämpfung durch Berberitzenausrottung in Württemberg.** [Black rust control through Barberry eradication in Württemberg.]—*Kranke Pflanze*, xii, 4, pp. 55–58, 1935.

Notes are given on the organization of the barberry eradication campaign for the control of cereal black rust [*Puccinia graminis*] in Württemberg [*R.A.M.*, xiv, p. 88] and on the various methods of extermination employed. It is estimated that between 40,000 and 50,000 bushes have been uprooted to date in the rural districts of Alb and Oberland.

Tasugi (H.). **On the physiology of Typhula graminum, Karst.**—*J. agric. Exp. Sta., Tokyo*, ii, 4, pp. 443–458, 2 pl., 1 fig., 1935. [Japanese, with English summary.]

The writer, pursuing his studies on the snow rot of cereals in Japan caused by *Typhula graminum* [*R.A.M.*, ix, p. 709; xiii, p. 223], summarizes the results concerning the growth of the fungus in relation to the choice of media, temperature, and hydrogen-ion concentration. Agar media containing decoctions of Gramineae and potato agar were the most favourable of the substrata used. The optimum temperature for development ranged from 8° to 15° C., with a minimum and maximum below 5° and at 22° to 23°, respectively. Growth was most profuse at P_H 7. From a consideration of the relationship between light and sclerotial production it may be tentatively concluded that under snow, which permits only the light of the longer wave-lengths to reach the soil, the sclerotia produce, instead of normal fructifications, creeping mycelia that invade the young host and cause snow rot.

Greaney (F. J.) & Machacek (J. E.). **Studies on the control of root-rot disease of cereals caused by Fusarium culmorum (W. G. Sm.) Sacc. and Helminthosporium sativum P., K., and B. II. Pathogenicity of Helminthosporium sativum as influenced by Cephalothecium roseum Corda in greenhouse pot tests.**—*Sci. Agric.*, xv, 6, pp. 377–386, 2 figs., 1935. [French summary.]

Greenhouse experiments [which are described in detail and discussed] carried out at Winnipeg showed that the pathogenicity to wheat of a fast-growing strain of *Helminthosporium sativum* was suppressed by the antagonistic action in the soil of *Cephalothecium* [*Trichothecium*] *roseum* [*R.A.M.*, xii, p. 729; xiii, p. 758].

Preliminary physiological studies demonstrated that the staling products released by *T. roseum* in liquid media markedly inhibited the germination and germ-tube growth of the spores of *H. sativum*, the toxicity of the substances produced by *T. roseum* probably being the chief factor in suppressing the pathogenicity of *H. sativum*.

Sprague (R.). **Wojnowicia graminis as a very weak, secondary parasite of winter cereal crops.**—*Phytopathology*, xxv, 4, pp. 405–415, 2 figs., 1935.

In Oregon and Washington *Wojnowicia graminis* [*R.A.M.*, v, p. 223] has been isolated from the following autumn-sown grains and grasses in the field: wheat (including *Triticum dicoccum*, *T. monococcum*, and *T. spelta*), barley, rye, oats, *Agropyron inerme*, *A. riparium*, *Bromus tectorum*, *Koeleria cristata*, and *Poa sandbergii*. *Cercosporella herpotrichoides* [ibid., xiv, p. 230] was consistently associated with *W. graminis* on the grasses, all of which were found in a restricted area of Spokane County, Washington. The results [which are discussed and tabulated] of six years' greenhouse inoculation experiments at Corvallis, Oregon, on wheat, barley, rye, and several grasses indicated that, in general, *W. graminis* causes little or no damage to its hosts, an outcome confirmed by field trials with wheat [cf. ibid., xiii, p. 569]. There was, however some evidence of rather more injury to rye and barley, the yield of the latter being reduced as a result of inoculation with an Australian strain of the fungus [ibid., xiv, p. 425].

The genus *Wojnowicia* Sacc. (Syll. Fung., xviii, p. 367, 1906) differs from *Hendersonia* Berk. mainly in the presence of blunt setae on the pycnidia, and the writer questions the need for the original separation of the two. However, since the name *W. graminis* has become established, its retention pending further studies seems to be indicated, though it is considered probable that most of the species of both genera recorded on Gramineae, including *H. herpotricha* Sacc. (the pycnidial stage of *Ophiobolus herpotrichus*) [ibid., xiv, p. 352], *H. graminis* McAlp., and *H. secalina* Died., are strains of the fungus known as *W. graminis*. The latter has been found to consist of a complex of physiologic forms differing slightly among themselves in rate and type of growth on potato-dextrose agar and wheat grain cultures, as well as in pigmentation and crystalline precipitates on the former medium. Most of the cultures of this fungus found associated with *C. herpotrichoides* are of almost identical aspect except for the coloration induced in the

substratum (bright lemon, orange, or rosaceous), but at least four distinct strains were isolated from grasses and from wheat in the semi-arid parts of the Columbia Basin free from *C. herpotrichoides*. The Australian strains studied resembled those isolated from wheat in Oregon.

BOCKMANN (H.). **Über die betriebswirtschaftlichen Hintergründe der Fusskrankheiten des Weizens.** [On the underlying causes of Wheat foot rots inherent in methods of farm practice.]—*Dtsch. landw. Pr.*, lxii, 13, p. 155, 1935.

Present-day farming practice in Schleswig-Holstein, in relation to the steady extension of the area under wheat during the period from 1927 to 1933, is believed to be largely responsible for the persistence of lodging (*Cercosporella herpotrichoides*) in the local crops, from which blackleg [*Ophiobolus graminis*], the other main type of root rot, is stated to have been virtually eliminated. The cultural factors involved in the etiology of lodging and the means for its prevention are briefly discussed in connexion with the writer's personal observations [*R.A.M.*, xiii, p. 569; xiv, p. 351, and next abstract].

MEYER-BAHLBURG & BINDFEIL. **Betriebswirtschaftliche Hintergründe der Weizenfusskrankheiten?** [Are methods of farm practice the underlying causes of Wheat foot rots?]—*Dtsch. landw. Pr.*, lxii, 15, p. 184, 1935.

The first-named writer disputes Bockmann's view [see preceding abstract] that the occurrence of wheat foot rots [especially *Cercosporella herpotrichoides*] in Schleswig-Holstein is bound up with modern trends in farm practice. The simplest and most radical, but also the dearest, method of combating these diseases is to 'starve out' the parasites by the interposition of black fallow in the crop rotation, but Schaffnit's recommendations for the deep ploughing-under of the stubble of the preceding crop [*R.A.M.*, ix, p. 587] have been abundantly justified in local practice [cf. also ibid., xii, p. 157; xiv, p. 230]. Where this precaution is strictly observed the area under wheat may safely be extended (by as much as 50 per cent. in a case under personal observation) without disorganizing the existing rotation system.

The second-named writer very briefly considers the relation of undue luxuriance in autumn-sown wheat to the subsequent development of *C. herpotrichoides*.

GUYOT (A. L.). **Observations sur quelques maladies fusariennes des céréales en France.** [Notes on some *Fusarium* diseases of cereals in France.]—*Rev. Path. vég.*, xxi, 4, pp. 143–186, 1 pl., 10 figs., 1934. [Received July, 1935.]

The results of cultural and morphological studies [full details of which are given] carried out during several years by the author indicate that species of *Fusarium* are frequently associated with cereal (oats, barley, and wheat) foot and root rots in France, especially when due to *Ophiobolus graminis* [*R.A.M.*, xiv, p. 351], and that lodging and 'échaudage' [scalding] which are typical of such rots, are also produced by these species. They are also frequently found in cases of disease unassociated with the typical mycelial plates of *O. graminis* and there seems little

doubt that they are responsible for a number of cases of cereal disease. All the *Fusarium* forms which have been isolated from affected cereals in France are referable either to *F. herbarum* [ibid., xii, p. 278] and its varieties *graminum* (Cda) Wr. (=*F. graminum* Cda), and *avenaceum* (Fr.) Wr. (=*F. avenaceum* (Fr.) Sacc.=*F. subulatum* App. & Wr.) or to *F. culmorum* [ibid., xiii, p. 758] (=*F. rubiginosum* App. & Wr.). In the last-named species there appeared to exist strains, some of which corresponded more closely in their morphological details to *Fusisporium culmorum* as described from wheat ears by W. G. Smith in 1884, while the others stood closer to *Fusarium rubiginosum* described in 1910 by Appel and Wollenweber from mummified potatoes. Observations further showed that these *Fusarium* forms are responsible for a generalized browning of the basal internode of cereals, differing from that associated with ordinary foot rot in the absence of superficial black mycelial mats, as well as in the shape and appearance of the lesions.

Churchward (J. G.). **A note on the occurrence in New South Wales of black chaff of Wheat caused by Bacterium translucens var. undulosum S.J. and R.**—*J. roy. Soc. N.S.W.*, lxviii, pp. 104–106, 1935.

Wheat black chaff (*Bacterium translucens* var. *undulosum*) [*R.A.M.*, xiii, p. 428], which has probably been present for several years in New Sourh Wales, was definitely identified in three localities there in 1934. Cross-inoculations showed that the causal organism was able to infect wheat and rye. Federation wheat, when grown under glasshouse conditions, was less susceptible than Hope. Preliminary tests indicated that the hot water treatment for loose smut [*Ustilago tritici*] also reduces infection by black chaff.

Chaudhuri (H.). **A bacterial disease of Wheat in the Punjab.**—*Proc. Indian Acad. Sci.*, i, 10, pp. 579–585, 1 pl., 1935.

After referring to earlier investigations into earcockle of wheat [*R.A.M.*, vi, p. 216; xii, p. 749] and the associated bacterial disease, the author describes inoculation experiments carried out in the Punjab which demonstrated conclusively that, contrary to the view generally held hitherto, the disease can be caused by *Pseudomonas tritici* alone, the presence of the nematode *Tylenchus scandens* [*Anguillulina tritici*] being unnecessary. Earcockle infection always takes place in the soil, usually when the seeds germinate, whereas in the bacterial disease infection may occur at any stage of plant growth, though late infection causes very little distortion.

Lowig (E.). **Ueber den Einfluss der Kalisalze, insbesondere ihrer Anionen, sowie der Kieselsäure und des Stickstoffs auf die Mehltauresistenz von Getreide und Futterpflanzen.** [On the influence of potash salts, especially of their anions, as well as of silicic acid and nitrogen on the resistance to mildew of cereals and fodder plants.]—*Landw. Jb.*, lxxxi, 2, pp. 273–335, 15 figs., 4 graphs, 1935.

This is an amplified, fully tabulated account of the writer's studies on the preventive action of potash salts and silicic acid against cereal mildew (*Erysiphe graminis*) [*R.A.M.*, xii, p. 620; cf. also xiv, p. 26].

The experiments have since been extended to the mildew [*E. graminis*] of the grasses *Phalaris arundinacea*, *Dactylis glomerata*, and *Festuca pratensis*, and to that [*E. polygoni*] of crimson clover (*Trifolium incarnatum*), with confirmatory results. White spotting is a typical feature of potash shortage in oats, fodder grasses, and clover. A direct proportion was established between nitrogen content and mildew in the test plants [ibid., vi, p. 156]. It is evident from the experimental results that potash acts as a regulator for the absorption of nutriment by the plant; possibly its absence modifies the permeability relations of the protoplasm and transforms the osmotic functions into diffusion processes.

Morwood (R. B.). **Report of cereal smut experiments, 1934.**—*Qd agric. J.*, xliii, 4, pp. 337–342, 1935.

In comparative tests with various seed treatments against cereal smuts in Queensland, the best control of wheat bunt (*Tilletia foetens* and *T. caries*) was given by commercial copper carbonates, Victoria standard copper carbonate, abavit B, and Cooper's mercurial A and B, which reduced infection from about 40 per cent. in the controls to under 2, 1·7, 0·3, 0, and 2 per cent., respectively.

Against barley covered smut (*Ustilago hordei*) the best method of applying formalin was sprinkling, which caused less injury to germination than other formalin treatments; in two experiments formalin sprinkle gave 0 and 0·3 per cent. infection, respectively, the figures for ceresan (2 oz. per bushel) and Cooper's A and B (mercury dusts not yet available commercially, applied at the rate of 3 oz. per bushel) being 2·3 and 0, 2 and 0·3, and 2 and 0 per cent., respectively. The results obtained with the dusts did not warrant increasing the dose to 3 oz. per bushel but any reduction below 2 oz. is considered inadvisable.

Formalin (1:240, 10 minutes' soaking), sublimatoform (1 part of mercuric chloride and 2½ parts of formalin per 1,000 parts water), abavit B, and ceresan reduced loose and covered smut of oats (*U. levis* [*U. kolleri*] and *U. avenae*, respectively) from an average of 32 per cent. in the controls to 0, 0, 0·5, and 0·5 per cent., respectively.

Excellent control of *U. bromivora* [*R.A.M.*, xii, p. 294] on prairie-grass [*Bromus unioloides*] was given by abavit B and ceresan (3 oz. per 20 lb. of seed) which reduced infection from 83·5 per cent. in the controls to 0·1 and 0 per cent., respectively; formalin (10 minutes' immersion) reduced infection to 0·2 per cent., but adversely affected germination.

Petit (A.). **Observations sur le traitement des semences des céréales. Toxicité du soufre précipité pour le charbon couvert de l'Orge.** [Notes on the treatment of cereal seed-grain. Toxicity of precipitated sulphur to covered smut of Barley.]—*Rev. Path. vég.*, xxii, 1, pp. 57–59, 1935.

The author states that in 1934 a plot of barley raised in Tunis from seed-grain artificially inoculated with covered smut [*Ustilago hordei*] spores and dusted with hydrophilous precipitated sulphur at the rate of 350 gm. per quintal [50 kg.] remained completely free from the disease [*R.A.M.*, xiv, p. 159], while a control plot from seed similarly inoculated but not dusted, exhibited a slight attack by the smut. The treatment

should be further tested, since the cost of the precipitated sulphur is about half that of cupric salts used for cereal seed disinfection.

VEARS (C. K.) & MACINDOE (S. L.). **Oat smut. The reactions of varieties to the disease.**—*Agric. Gaz. N.S.W.*, xlvi, 4, pp. 187–190, 1 pl., 1 fig., 1935.

The average reduction in yield from smut [*Ustilago avenae* and *U. kolleri*] on the widely grown White Tartarian oats variety in New South Wales is stated probably to amount to 10 per cent. *U. avenae* is the more prevalent of the two smuts in the State. Brief directions for the control of the disease are given. Tests showed the following varieties to be immune: Baxter, Bimbi, Black Mesdag, Burt's Early, Estramadura Grey, Fergusson Navarro, Kandos, Victoria, Frazier, Fulghum, and Lampton, of which the last three are commercial or promising new varieties. Lampton is of considerable importance; a Departmental oat of the breeding Abruzzes × Victory × Reed, it is highly resistant to stem [black] rust [*Puccinia graminis avenae*], is very strongly strawed, and produces good grain; it is later maturing than Algerian and coarser in the straw, but does not recover so well after grazing.

POPP (W.) & HANNA (W. F.). **Studies on the physiology of the Oat smuts.** —*Sci. Agric.*, xv, 6, pp. 424–434, 3 figs., 1935. [French summary.]

In this paper the authors give a full account of their investigations into the relationship between the loose and covered smuts of oats (*Ustilago avenae* and *U. levis* [*U. kolleri*]), a preliminary report on which has already been noticed [*R.A.M.*, x, p. 304]. The following points are new. Proof of the dominance of the factor for spore echinulation was obtained by back-crossing cultures of the F_1 hybrid (*U. avenae* × *U. kolleri*) with cultures of *U. avenae* and *U. kolleri*.

The appearance of smutted heads, whether covered or loose, was not a consistently reliable indication of the kind of chlamydospores they contained, though plants inoculated with cultures bearing the factor for echinulate spores produced a higher proportion of heads of the loose type than did those inoculated with cultures bearing the factor for smooth spores. There was some evidence that environmental factors also influence the type of head produced.

Segregation for sex and cultural characters occurred at the first or second division of the chlamydospore nucleus.

No significant difference was found in the ability of *U. avenae*, *U. kolleri*, the F_1 and F_2 generations of *U. avenae* × *U. kolleri*, and the F_1 of (*U. avenae* × *U. kolleri*) × *U. kolleri* spores to germinate, but sporidia of the F_1 of *U. avenae* × *U. kolleri* spores, as compared with those of the others, were much less capable of growth on artificial media.

REED (G. M.). **Reports on research for 1934. Plant pathology.**—*Rep. Brooklyn bot. Gdn, 1934* (*Brooklyn bot. Gdn Rec.*, xxiv, 2), pp. 50–58, 1935.

A summary is given of the results of experiments conducted during 1934 with the second, third, fourth, and fifth generations of the oat hybrids undergoing investigation for the inheritance of their reaction to loose and covered smuts [*Ustilago avenae* and *U. kolleri*: *R.A.M.*, xii,

p. 562; xiv, p. 436, and next abstract], a full account of which is stated to be in preparation. Definite evidence was obtained from extensive observations on smut collections from red oat varieties that the Fulghum race of *U. avenae* is quite distinct from that on Red Rustproof, both being readily separable from many other highly specialized strains of the fungus. Particular interest attaches to the strain of *U. kolleri* on Fulghum on account of its capacity to attack the ordinarily highly resistant Black Mesdag. Analytical data on 235 chlamydospore and conidial cultures from 11 races of *U. avenae* kept under observation for periods from 2 months to 4 years revealed in several cases continuous definite variations in colour and topography extending through one to five culture generations. Similar results were obtained in a somewhat smaller proportion of the 244 cultures from 6 strains of *U. kolleri* examined for the same purpose.

Some 50 per cent. of the Feterita sorghum plants inoculated with covered smut [*Sphacelotheca sorghi*: ibid., xiv, p. 504] failed to produce normal heads and bore little or no grain; in certain instances the smut balls of the fungus were found on the diseased flower buds, indicating that the mycelium had developed in the plant to the stage of spore formation. Under normal field conditions Feterita is resistant to *S. sorghi* [ibid., xiii, p. 227], but genetically its response is evidently quite different from that of Milo which, as in previous seasons, remained completely immune. Notes (to be amplified in a subsequent publication) are given on the results of experiments on five generations of sorghum hybrids in connexion with studies on the inheritance of reaction to *S. sorghi*.

Reed (G. M.). **Inheritance of resistance to loose smut in hybrids of Fulghum and Black Mesdag Oats.**—*Bull. Torrey bot. Cl.*, lxii, 4, pp. 177–186, 1 graph, 1935.

The results [which are tabulated] of the author's studies on the inheritance of resistance to loose smut (*Ustilago avenae*) in four hybrids of Fulghum (susceptible) and Black Mesdag (resistant) oats [see preceding abstract] indicated that, as judged from the behaviour of the F_2 and F_3 generations, resistance to the particular race of loose smut used (collected from Fulghum) is dominant and that segregation occurs on the basis of a three to one ratio [cf. *R.A.M.*, xiii, p. 761]. In a few cases, completely resistant F_3 progenies of F_2 populations subjected to the inoculation test gave rise to F_4 families in which a smutted plant was observed, but all of the F_4 progenies grown from resistant F_3 families were resistant. Very susceptible F_3 progenies (descended from non-inoculated F_2 populations), on the other hand, produced F_4 families showing great variation in the amount of smut (from 7·1 to 100 per cent.), but most of them contained over 50 per cent. of smutted plants. These results are considered to indicate that resistant selections may be easily secured through a series of generations.

Sanford (G. B.). **Colletotrichum graminicolum (Ces.) Wils. as a parasite of the stem and root tissues of Avena sativa.**—*Sci. Agric.*, xv, 6, pp. 370–376, 2 pl., 1935. [French summary.]

From oats growing in the vicinity of Edmonton, Alberta, and affected

with the severe root rot recently reported [*R.A.M.*, xiii, p. 224] the author isolated a species of *Colletotrichum* identified by S. F. Ashby as *C. graminicolum* (*C. cereale* Manns) [ibid., ix, p. 22], the fungus being obtained from the young seminal roots, the seedling axis below the crown, the crown itself, and from sclerotioid bodies produced on parts in the field.

Pot-culture tests showed that the fungus severely attacked the seminal roots and injured the first internode, these effects corresponding to the symptoms observed in the field. As soon as the adventitious roots were established the plants tended to revive, and many became normal under the test conditions. Faint beginnings of acervuli were noted about 40 days after seeding. Recovery of plants in the field also coincided with the development of adventitious roots, which as a rule, are not deeply penetrated by the fungus.

Histological examination of infected material showed that the cortex of the young seminal roots and that of the stem between the scutellar and crown nodes appeared to be the parts most severely affected. Except for a transient compatibility between host and pathogen, there was complete early collapse of the cells of the cortex and endodermis, with disintegration of the invading hyphae. Some resistance was offered by the stereome and the elements of the vascular bundles, but all were penetrated though the cells remained intact and the hyphae did not disintegrate.

The isolate used in the tests did not attack wheat, barley, or flax, though as the fungus was obtained from wheat and oats stubble, it is considered that races of *C. graminicolum* specific to the two last-named hosts may exist.

RADEMACHER (B.). **Die Dörrfleckenkrankheit.** [The grey speck disease.] —*Flugbl. biol. Reichsanst., Berl.* 136, 4 pp., 2 figs., 1935.

Popular notes are given on the ecology, host range, symptoms, and control of grey speck [*R.A.M.*, xiv, p. 122] of oats and other crops in Germany. The disease may be combated directly by soil treatment with finely ground manganese sulphate (50 to 150 kg. per hect.) and indirectly by the persistent application of physiologically acid fertilizers to release the available manganese, as well as by the cultivation of resistant varieties of oats, only the black types of which are suitable for seriously affected soils.

RADEMACHER (B.). **Die Heidemoorkrankheit (Urbarmachungskrankheit).** [The heath bog disease (reclamation disease).]—*Flugbl. biol. Reichsanst., Berl.* 137, 4 pp., 1 pl., 1935.

Notes are given in popular terms on the ecology, host range, symptoms, and control (direct and indirect, i.e. by cultural measures) of the reclamation disease of cereal and other crops in Germany [*R.A.M.*, xii, p. 86; xiv, p. 160]. Equally effective with copper sulphate (1·5 to 3 per cent., 800 l. per hect.) for soil treatment against this disease, but more expensive, are the copper-containing preparations used in charlock [*Brassica sinapis*] control, namely, germanit (Fahlberg-List A. G., Magdeburg-Südost), hedrinol (Silesia, Ida- und Marienhütte, Post Saarau, Kreis Schweidnitz), obranit (Chem. Fabriken Oker und Braunschweig A. G., Oker, Harz), and raphanit (also supplied in dust form)

[ibid., x, pp. 489, 704] from Schering-Kahlbaum A. G., Abt. Schädlingsbekämpfung, Berlin N. 65, Müllerstr. 170, 171.

Barnette (R. M.) & Warner (J. D.). **A response of chlorotic Corn plants to the application of zinc sulfate to the soil.**—*Soil Sci.*, xxxix, 2, pp. 145–159, 2 pl., 1935.

'White bud', a serious disease of maize in Florida, characterized by a white to very pale yellow coloration of the unfolding buds of seedlings and by a chlorotic streaking and spotting of the older leaves [cf. *R.A.M.*, vii, p. 740; x, p. 686; xii, p. 746], was shown by experiments [the results of which are tabulated and discussed] on the Whatley's Prolific variety to be curable by the application to the soil of 'chemically pure' zinc sulphate ($ZnSO_4.7H_2O$), a mixed inorganic fertilizer, and alkaline peat at the rates of 20 and 400 lb. and 5 tons per acre, respectively. Good results were also given by stable manure and leaf mould (4 and $2\frac{1}{2}$ tons, respectively), while chicken manure (2 tons) and alkaline peat effected a considerable improvement in the diseased condition without, however, entirely counteracting the symptoms.

Hiura (M.). **Mycological and pathological studies on the downy mildew of Italian Millet.**—*Res. Bull. Gifu Coll. Agric.* 35, pp. 121–283, 6 pl., 1935.

Some of the data obtained by the writer in his extensive investigations on the mycological and pathological aspects of downy mildew (*Sclerospora graminicola*) on *Setaria italica* in Japan have already been presented in preliminary reports [*R.A.M.*, viii, pp. 441, 716; ix, pp. 105, 774; x, p. 23; cf. also xiii, p. 629]. In this monographic study the results of the whole investigation are collected, tabulated, and exhaustively discussed.

Two types of infection are differentiated, systemic and local, the chlorotic areas on the leaves due to the former usually being large and laciniate while those associated with the latter are restricted or spotted. Conidial dimensions increase with the growth of the host and the advance of the season, the spores becoming slightly more elongated as the temperature rises. A reduction in the size of the conidia and conidiophores accompanies a drop in atmospheric humidity. The conidia produced on seedlings are smaller than those on well-grown plants, while those on metamorphosed leafy structures are usually very large. The temperature range for conidial production in *S. graminicola* is from 10° to 25° C. with an optimum at 17° to 18°, the period required for their formation being shortest at 18° to 20°. In cool, cloudy weather they are often produced in the daytime. The minimum atmospheric humidity for conidial development averages between 80 and 85 per cent. at 18°. The period required for conidial germination varies with different temperatures, ranging from 30 minutes at 20° to 25° to 5 hours at 6° to 7°; the minimum, optimum, and maximum temperatures for the process are 5° to 7°, 18°, and 30° to 32°, respectively. The conidia of *S. graminicola* are remarkably short-lived, dying shortly after the evaporation of the moisture from the fructification layer. Their viability may be prolonged, however, under humid conditions.

Oospore germination appears to be most profuse between 20° and 25°. The percentage of germinating oospores was found to increase in over-

wintered material, indicating the existence of a dormant period. Profuse infection was found to occur in soil inoculated with oospores three years previously, but after five years their viability seemed to be lost. In general, the oospores of the fungus from *Setaria italica* are somewhat larger than those formed on other hosts.

Seedling infection may take place through the mesocotyl (inoculations at the base of which produced the mildew symptoms after 15 hours' incubation) as well as through the coleoptile and primary root.

A six-page bibliography is appended.

Tasugi (H.). **The relation of the environmental factors and the treatment of oospores to the infection by oospores of Sclerospora graminicola (Sacc.) Schroet. (Studies on Nipponese Peronosporales IV.)**—*J. agric. Exp. Sta., Tokyo*, ii, 4, pp. 459–480, 1935. [Japanese, with English summary.]

Using physiologic form IV of *Sclerospora graminicola* from *Setaria italica* [see preceding abstract], the writer carried out experiments to determine the response of the oospores to environmental factors and to treatment by heat and chemicals.

Infection by oospores was shown to be most active at a soil temperature of 20° to 21° C., the minimum and maximum for the process being about 12° to 13° and 30°, respectively. Seed sown during April was the most liable to infection, the incidence of which declined progressively during May, falling to 4 per cent. by the 28th of that month and ceasing entirely by the end of June. The highest percentage of infection was recorded at a soil reaction of P_H 5·20, above which there was a gradual decrease to only 15·96 per cent. at P_H 8·14. The disease was most severe in soils with a moisture content (based on the water-holding capacity) of 80 per cent., the range for comparatively serious damage, however, extending from 50 to 100 per cent.; at 40 per cent. the oospores of the fungus were unable to germinate.

Hot water treatment at 50° or 55° gave excellent control, no infection by the oospores resulting after one hour's exposure at the former or after 10 minutes' at the latter temperature. Mercuric chloride at 0·01 per cent. was effective when the steeping lasted for 2 hours or more, while at 0·05 per cent. it proved toxic to the oospores in 30 minutes. At 0·1 and 0·25 per cent. formaldehyde exerted a lethal action on the oospores in 4 hours and one hour, respectively. Even at 0·5 per cent. copper sulphate was not completely efficacious though in 4 hours a considerable reduction of infection was obtained.

Elze (D. L.). **Some experiments on the combined effect of Diplodia and green mould inoculations on Oranges.**—Reprinted from *Hadar*, 9 pp., 1934. [Received June, 1935.]

The results [which are discussed and tabulated] of experiments at Rehovoth, Palestine, on the effect on oranges of combined inoculations with *Diplodia natalensis* and *Penicillium digitatum* [*R.A.M.*, viii, p.236] showed that the virulence and rapidity of development of the former are slightly and those of the latter greatly increased by the mixture. In fact, when *P. digitatum* is present on an orange in an inactive condition, subsequent inoculation with *D. natalensis* may stimulate it into vigorous

parasitism. It is further probable, though not yet conclusively proved, that oranges from *Diplodia*-infected trees will be more liable to invasion by *P. digitatum* than healthy ones.

Citrus Experiment Station.—*Rep. Fla agric. Exp. Sta. 1933–34*, pp. 81–85, [1935].

In extensive experiments by G. D. Ruehle on the control of citrus scab [*Sporotrichum citri*: *R.A.M.*, xiii, p. 26] in different parts of Florida, one application of a Bordeaux-oil spray reduced the percentage of blemished fruit from 97 to under 10 per cent. A dormant Bordeaux-oil spray followed by two and three applications of a sulphur spray gave only slightly better control; a second Bordeaux mixture spray at petal fall reduced infection to 5 per cent. The results obtained indicate that one thorough, timely application of Bordeaux-oil spray is sufficient to give commercial control of the disease.

Klotz (L. J.) & Fawcett (H. S.). **Rind breakdown of Navel Orange.**—*Calif. Citrogr.*, xx, 5, p. 124, 1 fig., 1935.

Attention is drawn to a destructive breakdown of the rind of Washington Navel oranges that is stated to have caused considerable loss during the current harvest in California, where the mild winter favoured early ripening of the fruit with the consequence that the rind was abnormally weak and susceptible to injury of various kinds. The disorder appears to be a non-parasitic breakdown following cold, wet weather with north winds, and is probably induced by an internal and external liberation of rind oil, which leads to the development of a Mars yellow to Brussels brown (Ridgway) discoloration of the tissues injured by the toxic oil. Water spot [*R.A.M.*, xiv, p. 234] and rot, quite a distinct condition, may also occur on the oranges suffering from rind breakdown, a study of the factors promoting which were made with a view to control. Evidence was obtained in the packing-house that the use of ethylene gas [ibid., xii, p. 20] accentuates the breakdown and deepens the brown colour. The injury was simulated by bumping freshly-picked oranges and by the external application and hypodermic injection of rind oil. The injured areas of the rind are liable to infection by blue and green moulds [*Penicillium italicum* and *P. digitatum*], while the surface is often covered with the appressoria of the tear stain fungus [*Colletotrichum gloeosporioides*].

Kaden (O. F.). **Kulturmassnahmen als Bekämpfungsmittel der Stammfäule von Ölpalmen.** [Cultural measures as means of combating the stem rot of Oil palms.]—*Tropenpflanzer*, xxxviii, 4, pp. 140–144, 2 figs., 1935.

The writer's observations in West Africa have convinced him that *Fomes lucidus* and *F. applanatus* [*Ganoderma lucidum* and *G. applanatum*: *R.A.M.*, xi, p. 105; xii, p. 80; xiii, p. 604] only occur on oil palms weakened by some extraneous agency, the true cause of stem rot being either nutritional disturbances or senescence. A simple remedy for the disease consists in the heaping-up of the soil over the roots protruding from the ground, supplemented by the removal of superfluous leaves. Where infection has actually taken place the diseased

areas must be excised, the wound cauterized to prevent fresh attacks, and earth piled up round the trunk. These measures strengthen the tree and induce the formation of new roots; they are stated to have saved a number of valuable plantations in the regions under the author's supervision—Angola, the Congo, and St. Thomas and Princes Islands.

BAIN (F. M.). **'Bronze leaf wilt' of the Coconut Palm.**—*Proc. agric. Soc. Trin. Tob.*, xxxv, 12, pp. 507–521, 1934. [Received June, 1935.]

While the results up to date of the investigations, briefly mentioned in a previous communication, of the bronze leaf wilt of coco-nuts in Trinidad [*R.A.M.*, xiii, p. 289] do not warrant a definite conclusion as to the causes of the trouble, the balance of evidence indicates that environmental factors leading to a rapid water deficit in the plant tissue at a definite period are apparently of major importance. Certain types of soil are seemingly more favourable than others to the development of the disease, and further planting of coco-nuts on such soils is not considered to be advisable. Of several remedial treatments that were tested, recovery of four diseased trees resulted from watering in conjunction with applications of potassium and ammonium sulphates.

RUSSO (G.). **Il raggrinzimento o arricciamento del Cotone nella Somalia Italiana.** [Cotton leaf curl or crinkle in Italian Somaliland.]—*Agricoltura colon.*, xxix, 2, pp. 78–95; 3, pp. 133–143; 4, pp. 188–199, 12 figs., 2 graphs, 1935.

After briefly describing the symptoms of cotton leaf curl or crinkle as it occurs in Italian Somaliland, the author gives a full account of his investigations (carried out in the area concerned) into the nature and cause of the disease. He concludes that it is due, locally at least, to physiological factors set up by the high concentration of soluble alkaline salts in the soil resulting from the fact that the numerous deep cracks which are allowed to develop in the ground favour water evaporation by capillary action. The soil is very compact and sub-alkaline, and the irrigation water contains rather a large amount of chlorides, especially in the wet season. Further factors are the hot, dry, windy season in July and August, the rapid and considerable increase in the transpiration rate brought about by wind and sun, and the drop in temperature during the second half of July and the first half of August.

The author's experiments, in which insects taken from naturally diseased cotton in the field were fed on healthy plants with negative results, did not indicate that the form of leaf curl found locally belongs to the virus group of diseases. It is not found, even in the presence of insects, in fields where precautions are taken against the evaporation of soil moisture.

PICKETT (A. D.). **Some observations on an outbreak of the two-striped grasshopper (Melanoplus bivittatus Say) in Nova Scotia.**—*Canad. Ent.*, lxvii, 2, pp. 24–27, 1935. [Abs. in *Rev. appl. Ent.*, A, xxiii, 6, pp. 285–286, 1935.]

Under the very humid conditions prevailing in the Grand Pré district of Nova Scotia in July, 1932, a heavy infestation of the two-striped grasshopper (*Melanoplus bivittatus*) was reduced by 50 to 90 per cent. in

certain localities by *Empusa grylli* [*R.A.M.*, xiv, p. 497], introduced on infected individuals collected from the Avon River area where the fungus was observed to be present. In 1933 the insects were again decimated by the same fungus, only 20 to 25 per cent. of the originally abundant swarm being left by 15th August.

CARTER (W.). **The symbionts of Pseudococcus brevipes (Ckl.).**—*Ann. ent. Soc. Amer.*, xxviii, 1, pp. 60–64, 4 pl., 1935.

The symbionts of *Pseudococcus brevipes*, the insect vector of green spotting of pineapple leaves in Hawaii [*R.A.M.*, xiv, pp. 216, 379], were found on examination in Buchner's laboratory at Breslau to be enclosed within a light brown (occasionally pale creamy) mycetome in a mass of tracheae. They are of two kinds, one of which, the 'common symbiont', has been consistently detected in all the insects examined. It is characterized by extreme polymorphism, some cells being formed by budding after the manner of yeasts, others showing excessive vacuolation, while spherical forms (apparently representing the 'infection stage') develop in large numbers as the insect approaches maturity. The second, rod-shaped type, occurring only under certain nutritional conditions of the host, and apparently conditioning the oral secretions of the latter, is clearly analogous to a bacterium and is a constant feature of the mealy bugs producing green spotting of pineapple leaves in their feeding, being absent, on the other hand, from non-spotting colonies. Congenital transmission of the symbionts is effected by a process similar to that known in *P. citri*, except that in *P. brevipes*, aggregates of minute 'infection stages' pass from the adult mycetome to the developing egg.

GREGORY (P. H.). **The dermatophytes.**—*Biol. Rev.*, x, pp. 208–233, 1935.

This is a general survey of the literature (supplemented by a three-page bibliography) on the dermatophytes [cf. *R.A.M.*, viii, p. 445], which are discussed under the headings of the parasitic and saprophytic phases, affinities with other fungi, and classification. In respect of the last-named, the various new systems proposed of recent years are considered to be no improvement on Sabouraud's, which is widely known, extensively used, and should, in the writer's opinion, be retained with a few adjustments to bring it into line with the rules of botanical nomenclature.

HRUSZEK (H.). **Recherches sur la cause et la nature de la dégénérescence duveteuse des champignons des teignes.** [Studies on the cause and nature of the downy degeneration of ringworm fungi.]—*Ann. Parasit. hum. comp.*, xiii, 2, pp. 165–172, 1 pl., 2 figs., 1935.

The author cultured *Achorion gypseum* [*R.A.M.*, xiii, p. 768] on different natural media and on the usual synthetic media with or without the addition of certain substances, and also under varying environmental conditions. The results indicated that the fungus, in dependence on these nutritional and other factors, exhibits three very different types of growth, namely, one (hitherto considered as typical) characterized by a chalky macroscopic appearance and the presence of very numerous spindles of the *Microsporon* type; a second, considered by him to be atypical, of the pleomorphic downy type; and the third with a

faviform appearance and corresponding microscopic structure. The last mentioned usually develops under the effect of high temperature (37° C.), or when the fungus is cultured on certain natural media, e.g., apple slices. It is suggested that the usual synthetic media are too rich in nutrients for certain fungi, such as *A. gypseum*, and favour from the start the development of the degenerating downy type of growth.

BRANCHINI (B.). **Di una rara forma di dermatomicosi nel cane.** [On a rare form of dermatomycosis in the dog.]—Reprinted from *Atti Ist. bot. Univ. Pavia*, Ser. IV, vi, 53 pp., 23 figs. (1 col.), 1935. [English and Latin summaries.]

A dermatomycosis of the dog observed by the author in 1932 was ascertained to be due to a very rare fungus, *Achorion caninum*, described by Costantin & Sabrazès in 1893 as *Oospora canina*. Considerable details are given on the morphology and cultural characters of the fungus, of the influence of environment on it, and on experimental inoculations which reproduced the condition.

CONANT (N. F.). **Synonymie de Microsporum canis, Bodin 1902 et de M. equinum Nicolas et Lacomme 1906.** [Synonymy of *Microsporum canis* Bodin, 1902, and of *M. equinum* Nicolas & Lacomme, 1906.]—*Ann. Parasit. hum. comp.*, xiii, 2, pp. 161–164, 1935.

The author states that the name *Microsporum* [*Microsporon*] *felineum* [*R.A.M.*, xiii, p. 577] is untenable since Fox and Blaxall (1896–98), to whom it is generally attributed, never used the specific name and only referred to the fungus as the 'cat ringworm', 'the cat group of ringworm fungi', and the like. The name was first used in 1907 by Sabouraud in an explanatory legend to his photographs. In 1930 Langeron and Milochevitch showed that *M. felineum* is identical with *M. lanosum*, reducing the latter to the rank of a synonym, and referred the fungus to the genus *Sabouraudites* [ibid., x, p. 243; cf. also, xii, p. 23]. On the other hand in 1906 Nicolas and Lacomme showed that *M. lanosum* is identical with the dog ringworm fungus which in 1902 had been named *M. canis* by Bodin. In the author's opinion, therefore, the fungus should be known, for reasons of priority, as *M. canis*, with *M. lanosum* Sabouraud 1907, and *M. felineum* as synonyms.

The authority for the binomial *M. equinum* [ibid., xiii, p. 303] should be Nicolas & Lacomme 1906, since these authors were the first to use it for the fungus which was described by Bodin in 1898 as *M. audouini* var. *equinum*.

GOUGEROT (H.), COHEN (R.), CARTEAUD (A.), & DUCHÉ (J.). **Endomycose ulcéro-végétante du nez due à Endomyces albicans. Lupus vulgaire associé : hybride de mycose et de tuberculose.** [Ulcero-vegetative endomycosis of the nose due to *Endomyces albicans*. Common lupus associated: a combination of mycosis and tuberculosis.]—*Arch. derm.-syph.*, vi, 3, pp. 378–383, 2 figs., 1934.

Full clinical details are given of a case, examined and treated by the writers, of combined mycosis and tubercular lupus, manifested as a nasal ulceration in a 17-year-old girl. The causal organism was identified as *Endomyces albicans* [*R.A.M.*, xii, p. 288].

Uhry (P.). **Un cas d'endomycose sous-cutanée chez un diabétique.** [A case of subcutaneous endomycosis in a diabetic.]—*Arch. derm.-syph.*, vi, 4, pp. 478–481, 1 fig., 1934.

Endomyces albicans [see preceding abstract] was isolated from subcutaneous lesions developing as a sequel to pneumonia in a male patient suffering from diabetes. Positive results were given by inoculations on mice and guinea-pigs.

Ciferri (R.) & Redaelli (P.). **Prima contribuzione allo studio delle cosidette blastomicosi americane. Gli Endomyces del gruppo dermatitidis-capsulatus, agenti della dermatite verrucosa micosica di Gilchrist.** [First contribution to the study of the so-called American blastomycoses. The *Endomyces* of the *dermatitidis-capsulatus* group, agents of Gilchrist's mycotic verrucose dermatitis.]—*Atti Ist. bot. Univ. Pavia*, Ser. IV, vi, pp. 55–105, 12 figs., 1935. [Latin and English summaries.]

This is an expanded account of the writers' studies on *Gilchristia dermatitidis* (*Endomyces dermatitidis*, *E. capsulatus* and its var. *isabellinus*, and *Blastomyces gilchristi*), a preliminary notice embodying the salient features of which has already appeared [*R.A.M.*, xiv, p. 99].

Ninni (C.) & Fittipaldi (C.). **Contributo alla conoscenza della biologia e delle proprietà patogene delle Mycotoruleae.** [A contribution to the knowledge of the biology and of the pathogenic property of the Mycotoruleae.]—*G. Batt. Immun.*, xiv, 4, pp. 941–974, 4 figs., 1935. [French, English, and German summaries.]

It is apparent from the authors' studies [the results of which are fully discussed and the experimental data tabulated] that the Mycotoruleae, including *Candida* spp. and *Mycotorula zeylanoides*, are readily distinguishable from the Torulopsideae [*R.A.M.*, xiv, p. 306], e.g., *Torulopsis* spp. and *Cryptococcus hominis* [ibid., xiv, p. 100], and from *Saccharomyces cerevisiae* [ibid., xiv, p. 383] both by their different morphological aspect in cultures prepared from peritoneal exudations of inoculated guinea-pigs and by their divergent types of growth on carbolized Sabouraud's agar at appropriate concentrations. A description is given of the experimental infection of guinea-pigs with the Mycotoruleae and of the specific granuloma consistently obtained by simulating the conditions giving rise to the disease in man. A study was further made of the allergic reactions, sufficiently specific, developing in guinea-pigs in response to inoculation with *Candida* spp., as well as of the striking phenomena of hyper-receptivity connected with and superposed on the well-marked but feeble manifestations of resistance [ibid., xiv, p. 307].

Moore (M.). **A morphological and physiological study of two species of Posadasia : P. capsulata (Darling) Moore and P. pyriformis Moore.**—*Ann. Mo. bot. Gdn*, xxii, 2, pp. 335–360, 4 pl., 1935.

Continuing his studies on *Posadasia capsulata* and *P. pyriformis* [*R.A.M.*, xiii, p. 637; cf. also xiv, p. 446], the writer (using cultures that had already formed mycelium and presented no evidence of yeast-like cells) found that the fungi, which occur in the host as small cells 1 to 4 μ

in diameter, develop on an artificial substratum an aerial and submerged mycelium, giving rise to intercalary, lateral, or terminal, sessile or pedicellate chlamydospores, occurring singly or in groups and measuring 3 to 10 μ in diameter (or when enlarged at the hyphal tip 6 to 20 by 3 to 10 μ); sessile or pedicellate, spherical or piriform conidia, 2 to 8 μ in diameter; and a racquet mycelium. Tuberculate asci, which are spherical (5 to 25 μ) in both species and in *P. pyriformis* only also piriform (12 to 26 by 6 to 12 μ, usually 22 by 10 μ), develop from globose or clavate cells, 5 to 18 μ in diameter, in the apparent absence of any sexual contact. Each ascus contains a number of small, spherical spores which are set free by the rupture of the ascus wall to germinate and form a mycelium, though under favourable conditions the ascus itself may germinate with few or several germ-tubes. *P. capsulata* also differs from *P. pyriformis* in its relatively smaller size, scantier growth, and white to pale Isabella colour compared with Isabella to pale cinnamon in *P. pyriformis*.

The transference of *Cryptococcus farcinimosus* and *C. muris* to *Histoplasma* (=*Posadasia*) by Redaelli and Ciferri [ibid., xiv, p. 446] is not accepted by the author.

Moore (M.). **Head infection caused by a new Hemispora : H. coremiformis.**—*Ann. Mo. bot. Gdn.*, xxii, 2, pp. 317–334, 2 pl., 1935.

A full account is given of studies of a new species of *Hemispora*, *H. coremiformis*, isolated from a human head infection in Costa Rica. The fungus exists in a yeast-like form in the host and assumes a filamentous character on artificial media, the colonies on which are stellate, vermiculate, coremiform, or cerebriform, greyish-white, creamy-buff, light cinnamon, or pale Isabella. Coremia, composed of cells 5 to 21 by 3 to 6 μ, are formed on most solid media but not on liquid substrata. The mycelium consists of arthrosporoid cells, elongated forms, and short structures occurring either as simple or branched, septate hyphae, 2 to 4 μ in diameter, terminating in clavate, spherical, or ampulliform cells (hemispores) measuring 12 to 18 by 7 to 15 μ. The conidia measure 4 to 6 μ in diameter and the spherical and piriform blastospores 4 to 6 μ and 6 by 4 μ, respectively. The spherical intercalary chlamydospores measure 6 to 10 μ in diameter and the ovoid 12 to 14 by 8 to 9 μ. The echinulate spores produced by the apical cells of mature hyphae are 3 to 6 (generally 5) μ in diameter.

The author does not accept Ciferri's and Redaelli's view that the genus *Sporendonema* supersedes *Hemispora* [*R.A.M.*, xiii, p. 700], as there is insufficient similarity in the characters of the former genus to justify the change.

Dessy (G.). **La chimiothérapie des mycoses. VIème Partie. Torulopsismycose. Ière Communication. Expériences 'in vitro'.** [The chemotherapy of mycoses. Sixth part. *Torulopsis*-mycosis. First communication. Experiments *in vitro*.]—*Boll. Sez. ital. Soc. int. Microbiol.*, vii, 3, pp. 79–91, 1935.

Continuing his investigations [*R.A.M.*, xiii, p. 238], the author conducted experiments *in vitro* to ascertain the inhibiting power on growth in culture and the fungicidal effectiveness shown towards *Torulopsis cabrini*, *T. bergami*, *Geotrichoides krusei*, *Endomyces cortese*, *Mycotorula*

(*Mycotoruloides*) *aegyptiaca* Cif. et Red., isolated from human interdigital lesions in Cairo, *Saccharomyces gracilis caverniculae* (Redaelli) Stelling-Dekker, and *Candida pinoyi* [ibid., xiv, p. 308], by 51 colouring agents [ibid., xiv, p. 105] and 22 metallic salts.

The best results were given by methyl violet, malachite green, gentian violet, and crystal violet among the colouring agents, while of the metallic salts the most active were mercuric chloride and mercuric cyanide.

Kingery (L. B.), Williams (R.), & Woodward (G.). **Further studies in fungicides: comparative evaluation of phenol derivatives by modified laboratory procedure.**—*Arch. Derm. Syph., N.Y.*, xxxi, 4, pp. 452–460, 1 fig., 1 diag., 1935.

Of the 38 phenol derivatives investigated as to their toxicity towards *Monilia* [*Candida*] *tropicalis*, n-hexylresorcinol, 3,5-dibutyl phenol, and n-hexyl ether of resorcinol revealed the highest fungicidal values, while these in turn were surpassed by iodine [*R.A.M.*, xiv, p. 105]. Fungicidal activity appears to depend, not only on the constituents of a given side chain, but also on its position on the benzene nucleus. In a series of tests in which *C. tropicalis* was exposed to contact with proteins (human vesicle fluid, blood serum, and hide dust) so as to simulate its natural habitat, marked discrepancies were apparent between the fungicidal values and the clinical efficacy of some well-known therapeutic agents, such as salicylic and benzoic acids, suggesting that the recognized beneficial action of these drugs may be due rather to some specific reaction of the tissues to their application than to any effect on the pathogen. At high concentrations sodium hypochlorite [ibid., xii, p. 509] retained its toxic properties throughout the experiments.

Sartory (A.), Sartory (R.), Meyer (J.), & Baumli (H.). **Quelques champignons inférieurs destructeurs du papier.** [Some lower fungi destructive to paper.]—*Papier*, xxxviii, 1, pp. 43–44, 47–48, 51–52, 1935.

An expanded account, containing full morphological and physiological details of the organisms involved, is given of the writers' experimental studies at Strasbourg University on five paper-destroying fungi, a preliminary note on which has already appeared [*R.A.M.*, xiii, p. 770]. The species concerned were determined as *Cladosporium herbarum* var. *cellulosae* n. var., *Fusarium coeruleum* var. *cellulosae* n. var., *Aspergillus fumigatus* var. *cellulosae* n. var., *Actinomyces cellulosae* Krainsky, and *Monilia cellulosophaga* n. sp. The last-named is characterized by thick-walled, septate hyphae, 1·6 to 2·4 μ in width, bearing lemon-shaped macro- and microconidia, the former measuring in culture 3·9 by 2·4 μ and the latter 2 by 1·4 μ. The fungus grows best at 37° C., coagulating milk, liquefying gelatine, and forming gas from maltose, saccharose, glucose, and galactose.

Rossi (F.) & Rozzi (G.). **Su la decomposizione della cellulosa per opera dei funghi.** [On cellulose decomposition through fungal activity.]—*Boll. Ist. agr., Pisa*, x, 112, pp. 271–275, 1934. [Received July, 1935.]

Of the 30 fungi—common occupants of soil, air, and various natural

substrata—tested under controlled conditions at Pisa for their cellulose-destroying capacities on a silica gel-blotting-paper medium at 24° C., only two species of *Fusarium*, one of *Aspergillus* [cf. preceding abstract], and *Stachybotrys lobulata* gave positive results.

GALLOWAY (L. D.). **The moisture requirements of mould fungi, with special reference to mildew in textiles.**—*J. Text. Inst., Manchr*, xxvi, 4, pp. T123–T129, 2 pl., 1935.

In confirmation of observations made in technical practice, the addition of deliquescents, such as glycerol and magnesium chloride, to the size mixings and finishing pastes used in textile manufacture has been found to stimulate mould growth (directly and not by reason of the increased moisture uptake), while spore germination, e.g., in *Aspergillus niger* and *A. herbariorum* var. *major*, increased *pari passu* with rising concentrations of the latter deliquescent. The minimum relative humidity requirements of some common moulds [cf. *R.A.M.*, ix, p. 784; xiii, p. 702] were found to range from 75 to 95 per cent., among the less exacting organisms being *A. glaucus* (group), *A. candidus*, *A. versicolor* [ibid., vii, p. 580], and *Penicillium* spp., any of which are therefore liable to cause trouble under moderate storage conditions.

WOLLENWEBER (H. W.). **Alpenveilchen- (Zyklamen-) Welke, eine Krankheit pilzlicher Natur.** [Alpine Violet (Cyclamen) wilt, a disease of fungal nature.]—*NachrBl. dtsch. PflSchDienst*, xv, 4, pp. 38–39, 2 figs., 1935.

Some 10 per cent. of the potted *Cyclamen persicum* plants in frames and forcing houses in the Berlin district were destroyed in the late summer of 1934 by a wilt disease involving the leaves, inflorescences, and vascular bundles. From the last-named *Fusarium oxysporum* var. *aurantiacum* [*R.A.M.*, xi, p. 306] was isolated and inoculated with positive results into healthy plants through wounds in the bulb tips. *Cylindrocarpon radicicola* [ibid., xii, p. 224] occurred, presumably as a secondary invader, in the bulb of a wilted plant and was also found associated with a soft rot of the pedicels and bulbs in company with *F. solani*, *Nectria rubi* [ibid., vi, pp. 212, 529, 565], and *N. septomyxa*. Further investigations are necessary to determine the exact relations of these organisms to the disease under observation, while the part played by a *Gloeosporium* of the *fructigenum* group on the leaves is also obscure. The *Fusarium* infection, the optimum temperature for which lies round about 28° C., was presumably favoured by the exceptionally hot, dry summer.

GREEN (D. E.). **Leaf spot of Daphne mezereum caused by Marssonina daphnes (Desm. et Rob.) Magn.**—*J. R. hort. Soc.*, lx, 4, pp. 156–158, 2 figs., 1935.

This is an expanded account of the writer's investigations in 1934 on the leaf disease of *Daphne mezereum* in England caused by *Marssonina daphnes*, a note on which has already been published [*R.A.M.*, xiv, p. 173].

Wallace (E. R.). **Experiments on fungus diseases.**—*Holland County Council (Lincolnshire) Bulb Res. Sub-Ctte, Expts with Bulbs Rept., 1933*, pp. 37–47, 1934. [Abs. in *Chem. Abstr.*, xxix, 11, pp. 3763–3764, 1935.]

In experiments in the control of tulip 'fire' (*Botrytis tulipae*) [*R.A.M.*, xiv, pp. 366, 513], the bulbs treated for 1 hour either with 1 part formalin in 150 parts water, for 8 hours in bouisol (1:150) [ibid., xiv, p. 213], or twice for 5 minutes each in steriform (1:50) showed very good skins on cleaning. Various other treatments caused injury to the bulbs.

Lüstner (G.). **Ein Oidium auf Calanchoe.** [An *Oidium* on *Calanchoë*.]—*NachrBl. dtsch. PflSchDienst*, xv, 4, p. 41, 1935.

In February, 1935, the writer received from Darmstadt *Calanchoë* [*Kalanchoë* Adans.] leaves, their upper sides strewn with the circular or irregular, greyish-white patches of a mildew, beneath which the epidermis was necrosed and readily detachable. In severe cases the mesophyll was also dead and desiccated. Only one conidium was borne on the mostly tricellular conidiophores. The perfect stage could not be traced, so that for the present it is suggested the fungus be known as *Oidium calanchoeae* [no diagnosis being given]. This is stated to be the first appearance of the disease in the Darmstadt cultures.

Weiss (F.). **Aid of collaborators requested in Azalea flower spot survey.**—*Plant Dis. Reptr*, xix, 3, pp. 21–24, 1935. [Mimeographed.]

Further details are given of the Indian azalea [*Rhododendron indicum*] flower spot in the gardens bordering the Ashley and Cooper Rivers for 20 to 30 miles above Charleston, South Carolina, to which attention has already been drawn in a preliminary note [*R.A.M.*, xiv, p. 365]. The first conspicuous symptoms are small, irregular spots, white on coloured and brown on white flowers, either restricted to the two lower corollary lobes or scattered over the whole flower. Under warm, moist conditions the entire inflorescence may be involved in one or two days, at which stage the flowers collapse but remain on the twigs. The surface of the lesion appears viscid and the affected tissue is so completely disorganized as to rupture almost at a touch. In cool, dry weather the progress of the infection may be arrested, the spots developing well-marked margins and translucent centres, with a dirty white or pale brown surface. After five or six days, in cases of early, rapid attacks, the fungus forms one or more black, cupulate sclerotia in the blighted corolla; when infection is delayed abscission of the corolla may occur normally, the sclerotia developing later in the fallen flowers. Mid-season varieties, e.g., Formosa, Phoenicia, and Brilliant, are the most liable to infection, optimum conditions for which prevail during their blooming period. Field observations point to the implication of insects in the transmission of the disease, the study of which would be greatly facilitated by the help of collaborators in the collection of field material with observations thereon.

McWhorter (F. P.). **Some diseases of ornamentals in Oregon.**—*Plant Dis. Reptr*, xix, 2, p. 18, 1935. [Mimeographed.]

In 1934 many acres of bulbous iris varieties, notably Wedgwood, The First, and David Bless, were defoliated by *Heterosporium gracile*, the

Didymellina stage [*D. macrospora*: *R.A.M.*, xi, p. 559] of which has not been observed on these varieties in nature, though inoculations on bulbous plants with isolations from typical German iris leaf spot showed the organism to be identical on both. At present this is the most important disease of iris in Oregon, mosaic having been largely eliminated.

Some 20 per cent. of the Calla lily (*Zantedeschia ethiopica*) plants in a Portland greenhouse are reported to be suffering from a mosaic presenting every characteristic of a typical virus disease.

A canker of holly [*Ilex aquifolia*], which has been troublesome since 1929 and in 1933 killed over 1,000 trees in a nursery near Astoria, was found to be associated with *Phomopsis crustosa* (Sacc.) Bomm. & Rouss., while *Diaporthe* (?) *eres* [ibid., xiii, p. 270] was also present in some specimens. The canker is of the girdling type and appears on the green twigs as bright brown spots that soon darken and become depressed.

Alexopoulos (C. J.). **Gloeosporium leaf spot, a serious disease of Orchids.**—*Phytopathology*, xxv, 4, pp. 435–437, 1 fig., 1935.

A hitherto undetermined species of *Gloeosporium* has been found to cause a severe foliar infection of *Pholidota imbricata* in the University of Illinois glasshouses. Numerous sunken, reddish-brown, marginate spots, finally coalescing, often destroy the whole leaf. Infection may originate on either leaf surface. On reaching a diameter of some 5 mm., the lesions generally resemble a wide crater with a sunken centre and raised margin. The acervuli of the fungus develop in profusion on the shrivelled leaves, and preliminary inoculations with the spores on apple resulted in the characteristic symptoms of bitter rot (*Glomerella cingulata*) [*R.A.M.*, xiv, p. 40]. However, as perithecia have not been found, exact identification is impossible at present.

Bennett (F. T.). **Corticium disease of turf.**—*J. Bd Greenkeep. Res.*, iv, 12, pp. 32–39, 3 pl., 3 graphs, 1935.

A semi-popular account is given of the 'brown patch' disease of turf caused by *Corticium fuciforme* [see above, p. 562 and next abstract], which in England is stated to be most severe on fescue grasses [*Festuca* spp.] though also attacking others, e.g., *Agrostis tenuis*, *Poa annua*, *Lolium perenne*, *Holcus mollis*, *Bromus mollis*, and *Agropyron repens*. The fungus is most prevalent in the south on chalky or sandy soils but occurs also throughout the midland and northern counties and in Scotland.

The life-history of *C. fuciforme* is briefly described. The maximum growth is made at a mean summer temperature of 70° F., but its development, though retarded, is not inhibited by extremes, either of heat or cold. Growth was further found to occur through a reaction range of P_H 3·5 to 7·5.

The most promising results in the control of brown patch were obtained by the treatment of the turf with a proprietary mercurial powder (1 in 15,000), very closely followed by malachite green and Bordeaux mixture [cf. *R.A.M.*, xiii, p. 242 and next abstract].

Bennett (F. T.). **Fungus diseases of bowling and golf greens.**—*Agric. Progr.*, xii, pp. 164–169, 1935.

A popular account is given of British turf diseases caused by fungi, with special reference to *Fusarium nivale* [*Calonectria graminicola*] and *Corticium fuciforme* [see preceding abstract]. An affinity between the latter and *Geotrichum roseum* has been suspected but the fungi appear to be distinct, though similar in vegetative habit. The present extensive use of sea-marsh turf, consisting almost exclusively of the susceptible *Agrostis* sp. and red fescue (*Festuca rubra* var. *glaucescens*), is thought to be largely responsible for the widespread occurrence of disease, and in this connexion a brief discussion is given on the general management of greens, with special reference to the adjustment of the P_H values of the turf by appropriate treatments.

Malachite green has been found to be four or five times more toxic to *C. fuciforme* and ten times more so to *Calonectria graminicola* than mercuric chloride, and absolute control of both fungi is stated to have been secured by weekly applications of the former substance (1 in 10,000) in a dilute Bordeaux mixture.

Buchholtz (W. F.). **Relation of soil acidity to a seedling disease of Alfalfa on three Iowa soils.**—*Phytopathology*, xxv, 4, pp. 421–425, 1 fig., 1935.

Some of the information in this paper on the *Pythium* disease of lucerne on acid Iowa soils has already been noticed from another source [*R.A.M.*, xiv, p. 241], but the following additional points are of interest. Sugar beets, red and sweet clover [*Trifolium pratense* and *Melilotus alba*], alsike [*T. hybridum*], and flax have also been found affected by the same disorder in the field. Besides the beneficial effects of steaming and formaldehyde treatment of the soil, already noted in the case of lucerne and alsike, good results on a limited scale are reported from the dusting of sugar beet seed with hydrated lime and by liberal applications of limestone to a lucerne planting.

Horne (A. S.). **On the numerical distribution of micro-organisms in the atmosphere.**—*Proc. roy. Soc.*, Ser. B, cxvii, 803, pp. 154–174, 1935.

The author gives some details of the standardization suggested by him of the method of previous workers of exposing plates for catching air-borne micro-organisms, which was applied in 1930–1 in five separate centres in England and Northern Ireland for the study of the numerical distribution of the organisms in the air, principally in orchards selected to show variation in environmental conditions, and at different times of the year. The results of statistical analysis [considerable details of which are given] showed that the density of the air-borne organisms is dependent on the class of the micro-organisms, the day on which the observations were made, the time of day, position in the orchard, and rain. Data obtained from four different localities indicated that the actual numbers of micro-organisms counted, the degree of heterogeneity of populations, and the time of year when numbers decline to the minimum found in winter also depend on the locality, apparently in relationship to the standards of cultivation attained by the local fruit-growers.

GÜLL (A.). **Verwendungszweck, Wirkung und Kosten einiger Spritzmittel des Obstbaues.** [Purpose, action, and costs of some orchard sprays.]—*Obst- u. Gemüseb.*, lxxxi, 4, pp. 59–60, 1935.

Details are given of the uses, application, effects, and costs of some standard insecticides and fungicides commonly employed in German orchards. A winter treatment with lime-sulphur is stated to be less effective than one with fruit tree carbolineum, and the cost of the former (M. 3.50 for the requisite 20 l. per 100 l. water) is also unduly high. Lime-sulphur (2 per cent.) is indispensable, however, for the summer schedule against scab (*Fusicladium*) [of apples, pears, and cherries: *Venturia inaequalis*, *V. pirina*, and *V. cerasi*, respectively: *R.A.M.*, xiv, p. 317] and mildew of certain fruits. The cost of Bordeaux mixture (2 per cent.) is about M. 0·50 per 100 l.; for the post-blossom application a concentration of 0·5 to 1 per cent. is sufficient.

WINKELMANN (A.) & HOLZ (W.). **Beiträge zur Biologie und Bekämpfung des Apfelschorfes (Fusicladium dendriticum [Wallr.] Fckl).** [Contributions to the biology and control of Apple scab (*Fusicladium dendriticum* [Wallr.] Fckl).]—*Zbl. Bakt.*, Abt. 2, xcii, 1–3, pp. 47–61, 1 graph, 1935.

In 1934 the ascospores of apple scab (*Fusicladium dendriticum*) [*Venturia inaequalis*] were first detected in the air of apple orchards [by means of a spore trap, containing a lanolined slide, exposed among the trees] in three localities near Berlin on 10th April, on which date also the first discharge was observed on overwintered leaves [see next abstract]. The second dispersion lasted from 20th to 30th April, while the third began in two places early in May and terminated on the 20th; in the remaining locality it did not occur until the third week of the month. Infection resulting from the second dispersion took place just before blossoming. Conidia were not detected on the foliage until after 10th May and apparently were chiefly concerned with the purely local spread of the disease. The maximum benefit from spraying was derived at the time of the main (second) dispersion, when the effects of Bordeaux mixture were observed to be stronger and more permanent than the action of lime-sulphur.

WIESMANN (R.). **Untersuchungen über die Bedeutung der Ascosporen (Wintersporen) und der Konidien an den schorfigen Trieben für die Entstehung der Primärinfektionen des Apfelschorfpilzes Fusicladium dendriticum.** [Investigations on the significance of the ascospores (winter spores) and conidia on the scabby shoots in the origination of the primary infections of the Apple scab fungus *Fusicladium dendriticum*.]—*Landw. Jb. Schweiz*, xlix, 2, pp. 147–175, 4 figs., 5 graphs, 1935. [French summary.]

A detailed account is given of the writer's studies at Wädenswil, Switzerland, during 1932–3 on the relation of the ascospores and conidia on scabby apple shoots to the origination of primary infections by *Venturia inaequalis* [*R.A.M.*, xii, p. 178 and preceding abstract].

By means of a 'Condor' suction pump specially adapted for the purpose, 'filtration' of the orchard air was effected daily for 74 days (7th April to 20th June) in 1932, and for 56 days (8th April to 2nd June) in 1933, during which periods ascospores were found to be present in the

atmosphere. In the former year they were most numerous (maximum number caught per l. of filtered air 11) between 23rd April and 11th May, and in 1933 from 25th April to 10th May (maximum number per l., 1·37). In addition to the ascospores of *V. inaequalis*, those of pear scab (*V. pirina*) and white leaf spot (*Mycosphaerella sentina*) [ibid., **xiii,** p. 219] were found in abundance in the filters. The early and profuse development of the apple scab ascospores was correlated with pre-blossom primary infections on Gravensteins. The course of ascospore production in *V. pirina* ran parallel with that of *V. inaequalis* in both years, while the observations suggested that ascospores are the chief, if not the sole originators of white leaf spot in the early part of the season. The value of pre-blossom fungicidal treatment with a view to checking primary infection is discussed in relation to Swiss conditions.

Apple scab conidia were found to be liberated in appreciable numbers just before and at the onset of blossoming but their maximum liberation was deferred until the flowering was well under way. As with the ascospores, rain is a pre-requisite condition for conidial dissemination.

The destruction of dead leaves in the autumn was found to be very effective in reducing by some four-fifths the number of ascospores of the scab fungi in the air of the orchard. It was further shown that perithecial formation can be prevented by a late autumn application of 1 per cent. helion [ibid., xiii, p. 11] or 8 per cent. fruit tree carbolineum [ibid., xiv, p. 371], while the latter alone destroys the perithecia in the dead leaves on the ground in the early spring. Dormant treatments are ineffectual, however, against the conidia, owing to the protected situation of the mycelium below the swollen bark of the diseased shoots.

Cheal (W. F.). **Apple scab spraying experiments in the Wisbech area : the times of application—III.**—*J. Minist. Agric.*, xli, 12, pp. 1190–1194, 1 pl., 1935.

The results of the 1934 spraying experiments in the Wisbech area of Cambridgeshire, which were carried out on the same lines as in the preceding year [*R.A.M.*, xiii, p. 311], definitely showed the advisability of spraying at the 'green flower' stage for the control of apple scab [*Venturia inaequalis*] in that area on Cox's Orange Pippin, even if the young lateral wood has been heavily pruned away and the trees have been well treated in the previous year. This application was also shown to be exceedingly valuable on Bramley's Seedling in 1934, when the spring rains were very favourable for the development of scab, since the two plots which received it gave 87·6 and 85 per cent. clean fruit, respectively, as compared with 48·85 per cent. from the plot in which it was omitted, and 28·6 per cent. from the unsprayed plot. The results further tended to confirm the advisability of this early application on Emneth Early [loc. cit.], although it was not as important on this variety as on the other two.

Hamilton (J. M.). **Studies on Apple scab and spray materials for its control in the Hudson Valley.**—*Tech. Bull. N.Y. St. agric. Exp. Sta.* 227, 56 pp., 18 graphs, 1935.

Investigations, conducted over a period of five years, into the seasonal development and control of apple scab (*Venturia inaequalis*) in the Hudson Valley [*R.A.M.*, xi, p. 788] showed that ascospore discharge may

extend from the middle of April to the last week in June. The frequency and duration of the showers in the early part of the season, and the temperatures prevailing in the later part are the chief factors determining the length of time during which danger from primary infection persists. Pre- and post-blossom sprays were sometimes equally valuable. Every year most of the severe primary infection occurred during May. The pink, calyx, 10-day, and codling-moth (mid-June) sprays were the most important but the value of any individual spray depended on the incidence of infection the previous year and on the frequency and duration of rainfall in the current year. Spray materials fall mainly into two groups (1) protective and eradicative, such as lime-sulphur [ibid., xii, p. 638] and, to a less degree, dry lime-sulphur, and (2) merely protective, such as wettable sulphurs, sulphur dusts, and copper sprays. Liquid lime-sulphur (1 in 60), applied thoroughly, gave good control; when it was applied after infection periods its effectiveness was much increased by the addition of lead arsenate. Of the substitutes for liquid lime-sulphur tested dry lime-sulphur was the best. Applied at the proper times wettable sulphurs [ibid., xiii, p. 358], particularly in the cover sprays or after petal-fall, were a desirable modification of the lime-sulphur programme; dry-mix, Koppers flotation sulphur paste, Koppers flotation dry-wettable [ibid., xiii, p. 34], magnetic spray (a wettable sulphur containing about 99 per cent. sulphur), sulfrox, and kolofog [ibid., xiii, p. 528] for all practical purposes gave as effective control as lime-sulphur. Untimely applications of wettable sulphur resulted in considerable scab. Coposil (a proprietary fungicide, consisting of copper ammonium silicate, designed to overcome certain disadvantages of Bordeaux mixture, and intended also for use with insecticidal oils) [ibid., xiv, p. 382] appeared to give commercial control of scab; hydrated lime (about 6 in 100) should always be used with it. In limited trials a copper phosphate, lime, and bentonite mixture (2–4–2–50) [ibid., xiv, p. 381] gave indications of being at least as good as coposil. Though the date when the first post-blossom application can safely be made varies with the kind of apple, as a general rule (though this may not apply to McIntosh apples) even the most promising copper sprays should not be applied until at least one month after petal-fall.

Lime-sulphur sprays at 1 in 40, 1 in 60, and 1 in 80 adhered to McIntosh foliage in proportion to the strength of the dilution, though they washed off at approximately the same rate. Dry lime-sulphur (3–5–50) gave a degree of protection between those given by liquid lime-sulphur 1 in 60 and 1 in 80. The results given by dry-mix resembled those obtained with liquid lime-sulphur. The evidence indicated that wettable sulphurs and sulphur dusts may give either less or more protection than lime-sulphur, according to the rate of application and the concentration used.

Sulphur dusts when applied to practically dry leaves and set by dew may be reduced to a common level of about half that of a dry-wettable spray with as little as 0·14 in. of rain.

HARRISON (K. A.). **Mouldy core in Gravenstein Apples.**—*Sci. Agric.*, xv, 6, pp. 358–369, 1935. [French summary.]

Investigations [which are described, and the results of which are

tabulated and discussed] into the cause of 'mouldy core' [*R.A.M.*, x, p. 468], resulting in the premature dropping of Gravenstein apples in Nova Scotia, showed that the percentage of affected fruits depended directly on the percentage of open core, the latter condition resulting from rapid growth causing a break in the core tissues leading to an opening, usually in the calyx tube. The fungi present (*Alternaria tenuis* and *Fusarium* chiefly) were casual invaders. Affected apples were heavier than normal. Premature colouring appeared to be closely related to the condition in some instances, 60 to 75 per cent. of early matured fruits being affected, owing, probably, to excessively favourable growth conditions. Faulty pollination, which, by influencing the number of apples that set, indirectly affects their size, was also an important factor.

Atkinson (J. D.). **Progress report on the investigation of corky-pit of Apples.**—*N.Z. J. Sci. Tech.*, xvi, 5, pp. 316–319, 1935.

The results are tabulated of recent experiments in the Nelson district of New Zealand in the control of 'corky-pit' of apples (also known locally as poverty-pit, cork, corky-core, brown heart, crinkle, drought spot, or bitter pit) [see next abstract] by the injection of weak solutions of various mineral salts, using an adaptation of Roach's method [*R.A.M.*, xiii, p. 641], through holes in the trunk. The varieties tested for this purpose were Sturmer, Jonathan, and Granny Smith. Two trees treated with boracic acid remained free from corky-pit, another given the same compound showed an incidence of 3 per cent. among the fruits, while all those supplied with other salts, as well as the uninjected controls, contracted variable percentages of disease (up to 100).

Plagge (H. H.), Maney (T. J.), & Pickett (B. S.). **Functional diseases of the Apple in storage.**—*Bull. Ia agric. Exp. Sta.* 329, pp. 34–79, 29 figs., 1935.

Semi-popular notes are given on some functional or non-parasitic disorders [*R.A.M.*, x, pp. 114, 467] of stored apples in the United States, namely, scald [ibid., xiii, p. 42], Jonathan spot [ibid., xii, p. 574], mealy and soggy breakdown [ibid., xiv, p. 243, and next abstract], brown heart [ibid., xiii, p. 36], water core [ibid., xiv, p. 520], bitter pit [ibid., xiv, p. 462], freezing injury, the allied conditions known as cork, drought spot, York spot, and crinkle [ibid., xiii, pp. 170, 709, and preceding abstract], and also on *Penicillium* soft rot or blue mould [*P. expansum*: ibid., xiii, p. 781; xiv, p. 287].

Harding (P. L.). **Physiological behavior of Grimes Golden Apples in storage.**—*Res. Bull. Ia agric. Exp. Sta.* 182, pp. 317–352, 11 graphs, 1935.

The respiratory activity of apples just at the time of placement in storage was found to serve as an index to the storage capacity of the fruit, especially in respect of soggy breakdown [see preceding abstract]. Fruit picked and held at a fairly high temperature soon reached a high rate of respiration, and on transference to a lower temperature involving a retardation of activity a disturbance occurred within the tissue that was subsequently expressed by soggy breakdown. This condition de-

veloped with deferred storage when Grimes Golden apples at 50° F. were transferred during a period of high respiratory activity to 30°. The life of the fruit was prolonged by placing it in storage immediately after picking. A higher percentage of soggy breakdown developed in deferred storage fruit from plots receiving a high nitrogen (nitrate 5–5–10) treatment than in that from the control plots on which the nitrogenous fertilizer was omitted. At 50° the fruit from the former respired consistently more than that from the latter, whereas at 36° or 30° there was little difference.

WORMALD (H.). **Further studies of the brown-rot fungi. VII. A shoot wilt in stools and layer beds of Plum stocks, and its relation to wither tip.**—*J. Pomol.*, xiii, 1, pp. 68–77, 2 pl., 1935.

A brief account is given of experiments in 1933 the results of which conclusively showed that the outbreak of 'shoot wilt' and 'wither tip' which was observed in 1924 in stools and layer rows of plum stocks at the East Malling Research Station [*R.A.M.*, ii, p. 547] was caused by *Sclerotinia laxa* [ibid., xiv, p. 367]. The shoot wilt was experimentally reproduced in pots by inoculating the basal leaves through punctures with water suspensions of spores, and later adding soil to cover the inoculated leaves, while wither tip resulted from similar inoculations of the upper leaves on the shoots. Control recommendations include the location of stool and layer beds of plum stocks in sites removed as far as possible from established plum trees, and the immediate removal of any shoots exhibiting symptoms of the trouble.

KOCH (L. W.). **Investigations on the black knot of Plums and Cherries. III. Symptomatology, life history and cultural studies of Dibotryon morbosum (Sch.) T. and S.**—*Sci. Agric.*, xv, 6, pp. 411–423, 4 pl., 3 graphs, 1935. [French summary.]

Continuing the account of his study of the black knot fungus *Dibotryon morbosum* [*R.A.M.*, xiv, p. 177], the author states that more than 95 per cent. of new infections occur on current season's shoots and that at least 93 per cent. of all knots are visible as swellings during the autumn following infection. Some of these produce conidia during the autumn while perithecia frequently develop during the subsequent winter and spring. Almost invariably the invasion of the trunk results from infection through a small lateral. The host has a noticeable effect on the size of the ascospores, those from *Prunus pennsylvanica* having modes of 17 to 18 μ and 7 μ for length and width, respectively, whereas those on *P. domestica* were 16 μ and 6 μ. Ascospores only germinate when discharged from fully mature perithecia.

From each of 48 mono-ascosporous cultures of *D. morbosum* a species of *Hormodendrum* developed, showing 4 morphologically distinct strains. Additional proof of the genetic relationship was afforded by germinating ascospores which developed conidia typical of the *Hormodendrum* in 68 to 74 hours. Furthermore, when monosporous cultures were made from *Hormodendrum* conidia, colonies developed in every respect similar to those originating from ascospores, the same 4 morphologically distinct strains being observed. In several instances inoculations with ascospores or conidia gave knots which produced both stages. On 11 occasions

cultures from ascospores (3 from single spores) yielded a *Hormodendrum* which was quite hyaline [cf. ibid., viii, pp. 175] and less vigorous.

On the host the conidiophores of *D. morbosum* are erect, septate, usually simple, and measure 20 to 65 by 4 to 6 μ; the obovate, unicellular, light olivaceous-brown conidia are borne singly, usually at the apex of the conidiophore, and measure 4 to 8 μ by 2 to 5 μ. In culture the conidiophores vary greatly in length, frequently exceeding 100 μ and bear at the apex long dendroid chains of conidia measuring 3 to 20 by 2 to 5·5 μ.

Willison (R. S.). **Inoculation studies in Peach canker.**—Abs. in *Sci. Agric.*, xv, 6, p. 435, 1935.

When peach trees in Ontario were inoculated through wounds with monosporous cultures of *Valsa leucostoma* [*R.A.M.*, xiii, p. 246] and *V. cincta* isolated locally from peach cankers, as well as with *Sclerotinia americana* [*S. fructicola*: loc. cit.], the history of the wounds inoculated with *V. leucostoma* closely approximated to that of the uninoculated controls. *S. fructicola* produced some necrosis during the first two or three weeks, when the inoculations were made in the growing season, but little or none when they were made in winter. After the initial damage, healing progressed steadily except in a few wounds which became naturally contaminated with *Valsa* spp., generally with *V. cincta*. Inoculations with *V. cincta* during the dormant season and for four or five weeks before leaf fall produced cankers which either increased continuously, or increased and partly healed alternately; maximum necrosis resulted from infection at or about leaf fall, inoculations made in summer being comparatively innocuous.

Gaudineau (Mlle [M.]). **Observations sur les essais de traitement des arbres fruitiers à noyau dans le Sud-Ouest de la France.** [Notes on treatment experiments on stone fruit trees in south-western France.]—*Rev. Path. vég.*, xxi, 4, pp. 126–133, 1934. [Received July, 1935.]

The author states that spraying experiments since 1931 in south-western France (Lot-et-Garonne) showed that none of the peach varieties tested suffered from winter applications of neutral 2 per cent. Bordeaux mixture and anthracene oil against peach leaf curl [*Taphrina deformans*: *R.A.M.*, xiii, p. 76]. Certain early varieties (e.g., Mayflower and Amsden), however, are rather severely defoliated, under the local conditions, by spring applications of Bordeaux mixture, while no injury to them resulted from copper oxychloride sprays [ibid., xiii, p. 745], the efficacy of which against *Coryneum* [*Clasterosporium carpophilum*] and *Monilia* [*Sclerotinia laxa*] is now being tested.

Fitzpatrick (R. E.). **Further studies on the parasitism of Taphrina deformans.**—*Sci. Agric.*, xv, 6, pp. 341–344, 3 figs., 1935. [French summary.]

Preliminary studies at Toronto showed that infection of young peach trees in pots by *Taphrina deformans* [*R.A.M.*, xiii, p. 452; xiv, p. 374] occurred readily at temperatures between 50° and 70° F. Once infection

had taken place the severity of the disease was markedly affected by the conditions in which the trees were growing; at 70°, when the leaves were growing rapidly, the fungus died out, but at temperatures between 50° and 60°, when leaf development was slow, the incidence of leaf curl was high.

BARTHELET (J.). **Observations sur les maladies des rameaux de Framboisiers.** [Notes on the cane diseases of Raspberries.]—*Rev. Path. vég.*, xxii, 1, pp. 79–94, 5 pl., 1935.

The author gives notes on three parasitic fungi observed by him on raspberry canes in France. *Didymella applanata* [*R.A.M.*, xiii, p. 207], the taxonomy, morphology, and control of which are briefly discussed, has been recorded in France for more than 40 years. *Coryneum ruborum* [ibid., xiii, p. 288] produces on the shoots numerous, irregularly distributed black dots, frequently associated with cracks in the cortex. The fructifications measured in the author's material 300 μ in diameter, and contained spores 15 by 6 μ in diameter borne on conidiophores 14 to 40 μ long. The ascigerous stage (*Ascospora ruborum*) [ibid., iv, p. 490] was not found on the specimens examined. The third fungus, apparently of little economic importance, is considered to be a variety of *Cryptodiaporthe macounii* (Dear.) Wehm. [ibid., xiii, p. 270], and is named var. *rubi* (with a French diagnosis). It is characterized by small, intensely black, spherical or slightly flattened perithecia, 200 to 250 by 120 to 160 μ in diameter, aggregated in groups of four or six immediately under the cortical tissues. The asci are narrow, claviform, 30 to 35 by 5 μ, and contain distichous, bicellular, smooth spores, 8 to 10 by 2 μ in diameter. The pycnidia are of the *Phomopsis* type, scattered, sub-epidermal, black, round or flattened, and 0·5 to 1 mm. in diameter; the pycnospores are oblong, straight or slightly curved, 5 by 1 μ, and are borne on conidiophores, 12 to 15 μ in length.

SOKOLOFF (A. D.). Вредители и болезни Земляники и борьба с ними. [Pests and diseases of the Strawberry and their control.]—56 pp., 14 figs., Ленингр. Област. Издат. [Leningr. Province Publ. Office] 1934. [Received July, 1935.]

The chief point of interest in this small pamphlet is the information that, in view of the opening up of new areas in the U.S.S.R. for strawberry cultivation and the presence in the old ones of certain insect pests and diseases, quarantine measures have been introduced to regulate the movement of planting material not only from abroad and from one district to another inland, but also among growers in the same locality. The two most important diseases of the crop in the government of Leningrad are stated to be leaf spot (*Mycosphaerella fragariae*) [*R.A.M.*, xiii, p. 786] and grey rot (*Sclerotinia fuckeliana*) [ibid., xii, p. 316], brief accounts of which are given.

MASSEE (A. M.). **On the transmission of the Strawberry virus 'yellow-edge' disease by the Strawberry aphis, together with notes on the Strawberry tarsonemid mite.**—*J. Pomol.*, xiii, 1, pp. 39–53, 3 pl., 1 plan, 1935.

The results of experiments in 1933 and 1934 at the East Malling

Research Station [a detailed account of which is given] are considered to have conclusively proved that the strawberry aphid (*Capitophorus fragariae*) is a vector of the strawberry yellow edge virus [*R.A.M.*, xiv, p. 179], but not the tarsonemid mite, *Tarsonemus fragariae*. There was some evidence that locally the optimum time for transference of the virus by the aphid is during June, and further work is in hand to determine this point.

Simmonds (J. H.). **Diseases of the Banana.**—*Qd agric. J.*, xliii, 3, pp. 254–267, 12 figs., 1935.

Notes are given in popular terms on the symptoms, etiology, and control of some important fungal and virus diseases of bananas in Queensland, reference to which has been made from time to time in this *Review*.

Hemmi (T.) & Kurata (S.). **Contributions to the knowledge of anthracnoses of plants II. On Gloeosporium olivarum Alm. causing the Olive anthracnose.**—*J. Soc. trop. Agric. Taiwan*, vi, 3, pp. 573–583, 3 figs., 1935.

Olive anthracnose, known in Portugal as 'gaffa' and caused by *Gloeosporium olivarum* [*R.A.M.*, xiii, p. 790], was reported from the Kagawa Agricultural Experiment Station, Nishimura, in October, 1930, this being apparently the first record of the disease in Japan. Infection was particularly severe on the Queen variety. The symptoms produced by the fungus are described and an account is given of its morphology, physiology, and pathogenicity. The optimum temperature for the growth of *G. olivarum* was found to be about 28° C. with a range from 5° to 40°. Almost identical results in respect of temperature relations were obtained in comparative experiments with *Glomerella cingulata* [cf. ibid., ix, p. 262], the agent of bitter rot of apples [ibid., xiv, p. 452], the growth characters of which, however, were quite different. The fact that the strain of *Gloeosporium olivarum* under observation assumes a pinkish tinge, especially on potato decoction agar, inclines the writers to regard it as possibly identical with the chromogenic form of apple *Gloeosporium* described by Shear and Wood (*Bull. U.S. Dep. Agric.* 252, 1913). Cross-inoculation experiments with *G. olivarum* and *Glomerella cingulata* gave positive results, the olive fungus producing on Jonathan and Ralls Janet apples symptoms resembling those of bitter rot, while conversely, the agent of bitter rot caused the development on Queen, Ammellenque, Sauren, and Mission olives of lesions similar to those of anthracnose, to which the last-named variety was relatively resistant. Sufficient differences exist, however, between the symptoms produced by the two fungi to maintain them as distinct entities—whether species or merely biologic forms is as yet uncertain. The retention of the name *Gloeosporium olivarum* is advocated for the present.

Benz (P.). **Standardisierung der Schädlingsbekämpfungsmittel?** [The standardization of plant protectives?]—*Landw. Jb. Schweiz*, xlix, 2, pp. 204–220, 5 figs., 1935. [French summary.]

At the tenth conference on the control of fruit tree diseases and pests, held at Wädenswil, Switzerland, on 1st December, 1934, it was decided

that active steps should be taken to bring about the standardization of plant protectives, with special reference to fruit tree carbolineum [see above, p. 589], by means of agreements freely concluded between the manufacturers and experiment stations. To this end it will be necessary to revise and bring into line with modern scientific and practical knowledge the legal bases of such contracts, as defined in the 'Rules for the supervision of commerce in agricultural accessories' and the 'Manual of agricultural accessories'. The new manual will formulate the characteristics of all anti-parasitic products, and define their minimum content in active substances in relation to chemical composition and physical properties. Supervision will further be required for testing the efficacy of the preparations fulfilling the requisite conditions and calculating the profits to be gained by their use. A resolution was passed enjoining purchasers of plant protectives to co-operate in the work of standardization by dealing exclusively with recognized firms.

WINKELMANN (A.). **Untersuchungen über die Wechselbeziehungen zwischen Beizlösungen und Metallen.** [Investigations of the reciprocal action of steeping solutions and metals.]—*Tech. i. d. Landw.*, xvi, 2, pp. 41–42, 1935.

The results [which are tabulated and briefly discussed] of tests to determine the action of five standard German plant protectives on the metals used for the construction of seed steeping apparatus [*R.A.M.*, iv, p. 624] for the short disinfection process showed that nirosta steel and lead are not attacked by any of the preparations used. Ceresan liquid (U. 564) [ibid., xiv, p. 546] was practically innocuous to copper, which was, however, severely corroded by weizenfusariol. Abavit liquid 'Schering' was not appreciably injurious to iron, which suffered to some extent, on the other hand, from germisan and still more so from weizenfusariol. Aluminium and zinc were so heavily damaged by all the fungicides (including fusariol) used in the trials that their use for those parts of the apparatus coming into contact with the solution should be discontinued.

In the reciprocal tests of the action of the metals on the fungicides, nirosta steel failed to change the composition of the solutions. Copper caused a loss of the effective principle only in weizenfusariol, aluminium in all the preparations, and zinc in all but ceresan. Iron caused precipitation of mercury in abavit liquid, germisan, and weizenfusariol, while lead produced the same effect on the two last-named.

BRANAS (J.) & DULAC (J.). **Sur quelques effets des produits ajoutés aux bouillies cupriques.** [Note on some effects of substances added to cupric sprays.]—*Rev. Path. vég.*, xxii, 1, pp. 13–18, 1 fig., 1935.

Very brief details are given of laboratory experiments, the results of which indicated that the addition to Bordeaux mixture of a colloidal emulsion of resin [*R.A.M.*, xiii, p. 113] as an adhesive agent reduces the efficacy of the spray, inasmuch as it renders the spray deposit after drying on glass slides and vine leaves insoluble and impervious to water. This suggests the advisability of carefully testing the effect on the spray liquid of any substance recommended as spreader or adhesive agent prior to its adoption in general practice.

ANTHONY (M. V.). **Apparatus for dusting sulfur on plants in controlled amounts.**—*Science*, N.S., lxxxi, 2102, p. 364, 1 diag., 1935.

In the course of comparative studies on different brands of sulphur, the need was experienced for an apparatus capable of delivering quantitatively small amounts of the disinfectant to the under sides of leaves. A dust gun was made from a small glass cylinder (80 by 15 mm.) fitted with a cork at each end, into one of which was inserted a metal tube with a 1 mm. aperture to admit compressed air at 20 lb. pressure and controlled by a valve obtained from a cheap spray gun. From the other cork led a glass tube, fire-polished to a 1 mm. aperture and connected by a rubber tube with the dusting chamber. The latter consisted of a large wooden box containing a phonograph turn table which was used to transmit power to a cylindrical tin held at an angle of 45° with the open end down. Into this tin were inserted plants grown in flower pots which revolved in their container with each turn of the phonograph. The sulphur came into the dusting chamber, hit a glass plate, and dispersed evenly over the revolving plant. To secure free passage of air through the dust gun a small rod is held in its centre while filling and then withdrawn so as to leave a cylinder of dust through the centre of which the air passes.

The dust gun may be converted into a very useful, small hand-duster by attaching a rubber bulb to the glass tube and a cheese cloth over the other end. A rod is held in the centre of the glass cylinder while filling, as in the case of the gun. The cheese cloth prevents the emission of coarse particles from the duster and simultaneously diffuses large puffs of dust.

TISDALE (W. H.). **Higher alcohol sulphates as spreading agents for insecticides and fungicides are studied.**—*Agric. News Lett.*, iii, 3, pp. 4–5, 1935. [Mimeographed.]

Extensive experiments and field demonstrations carried out during the past three years by the Du Pont Company and the Grasselli Chemical Company showed that the higher alcohol sulphates are excellent wetting and spreading agents for use with fungicides. In sprays, some are effective at dilutions of 0·025 per cent. They are also useful in the preparation of emulsions, can be employed in acids and dilute aqueous alkali solutions, and they withstand hard waters. Sodium lauryl sulphate (IN 181) and sodium oleyl sulphate special (IN 438) appeared to be the best for wetting and spreading purposes, the former for use with dusts, the latter with sprays.

BARILLET (F.) & CHOISNARD (A.). **Les parasiticides.** [Parasiticides]—*Industr. chim., Paris*, xxii, 255, pp. 245–250, 3 diags., 1935.

The physical and chemical requirements of liquid, solid, and gaseous agricultural disinfectants and various methods of determining them are discussed. According to a standard established at the Wädenswil (Switzerland) Agricultural Experiment Station [see above, p. 596], lime-sulphur mixtures should contain a minimum of 100 gm. sulphur per l. as polysulphides. Attention is drawn to the specifications recently issued by the English authorities [*R.A.M.*, xiii, p. 713].

Sproeien en sproeiers. [Sprays and spraying apparatus.]—*Versl. PlZiekt. Dienst Wageningen* 33 (5th edn.), 60 pp., 8 pl., 1935.

This is a revised and amplified version of the directions previously issued [*R.A.M.*, xi, p. 315] for the control of insect pests and fungous diseases of economic plants in Holland by the application of standard disinfectants, supplemented by information on the various types of machinery in use, the average cost and correct execution of treatment, and other points of interest.

Middelen tegen plantenziekten en schadelijke dieren. [Remedies against plant diseases and noxious insects.]—*Versl. PlZiekt. Dienst Wageningen* 43 (4th edn.), 46 pp., 1935.

This is a revised and enlarged edition of a previous pamphlet in the same series dealing with standard preparations, including many of international repute, for the control of plant diseases and pests [*R.A.M.*, ix, p. 730].

Renn (C. E.). **A Mycetozoan parasite of Zostera marina.**—*Nature, Lond.*, cxxxv, 3414, pp. 544–545, 1935.

The parasitic habit of the *Labyrinthula*-like organism found associated with the wasting disease of *Zostera marina* along the American Atlantic coast [*R.A.M.*, xiii, p. 793] is stated to have been demonstrated by observing the migration of the fusiform cells from diseased leaf fragments and into healthy leaf tissues. Consistent infection occurred, usually within 8 to 48 hours. In several eelgrass beds near Woods Hole, Massachusetts, slips of diseased and normal leaf were attached in alternate order to healthy green foliage, which developed the local darkening and characteristic streaking observed in nature after one or two days. The experiment was repeated four times during the late summer and corresponding tests were made in aquaria with identical results. Sections prepared from the newly infected areas showed heavy infestation by the pathogen in a viable state and these sections infected clean plants to which they were attached. The *Labyrinthula* failed to grow on artificial media or in filtered sea water.

The mycelium of the *Ophiobolus* isolated from diseased *Zostera* by Petersen, Miss Mounce, and Tutin [*O. halimus*: ibid., xiv, p. 50] is stated to be far from universally present in the region under observation, though sometimes found near Woods Hole. No trace of *Labyrinthula* could be found in the longer, wider-leaved form of *Z. marina* in Departure Bay, British Columbia, on the Pacific Coast [see next abstract].

Butcher (R. W.). **Wasting disease of Zostera marina.**—*Nature, Lond.*, cxxxv, 3414, p. 545, 1935.

Referring to the supposed connexion between leaf width in *Zostera marina* and susceptibility to wasting disease [*R.A.M.*, xiv, p. 245, and preceding abstract], the writer suggests that leaf size is due to the nutritional balance in the plant and that the present relative distribution of the large leaf type and *Z. marina* var. *angustifolia* is due to a large number of circumstances, not a single catastrophic event.

Lami (R.). **Travaux récents sur la maladie des Zostères.** [Recent investigations on the *Zostera* disease.]—*Rev. Bot. appl.*, xv, 164, pp. 263–266, 1935.

Briefly summing up the outcome of recent investigations on the wasting disease of 'varech' (*Zostera marina*) in France [*R.A.M.*, xiii, p. 46] and elsewhere [see preceding abstracts], the writer emphasizes its steadily increasing economic importance, not only on account of the loss of a valuable material for packing, stuffing, and the like, but also because fish, crustaceans, and molluscs are thereby deprived of shelter and lose the nutriment from the abundant animalculae which are found among the *Zostera* beds, with disastrous results. In some cases of complete destruction even the mud or sand forming the foundation of the beds has been washed away by the waves, so that reconstitution seems impossible. In some places there was a certain amount of regeneration of the beds during the summer of 1934 but this was often followed by a distinct regression in the winter.

Dufrénoy (J.). **L'immunité des plantes vis-à-vis des maladies à virus.** [The immunity of plants in respect of virus diseases.]—*Ann. Inst. Pasteur*, liv, 4, pp. 461–512, 16 figs., 1935.

This is a comprehensive survey and discussion of recent important advances towards the understanding of the problem of immunity in plants in relation to virus diseases [*R.A.M.*, xiii, p. 116]. Notices of all the work in question have appeared from time to time in this *Review*.

Rivera (V.). **I virus filtrabili nella patologia vegetale.** [Filterable viruses in plant pathology.]—*Atti Congr. naz. Microbiol., 1934*, pp. 91–137, 4 figs., 1935.

This paper describing the author's investigations into mixed virus and *Bacterium tumefaciens* infections has already been noticed from another source [*R.A.M.*, xiv, p. 384]; a bibliography extending to two and a half pages is appended.

Caldwell (J.). **On the interactions of two strains of a plant virus; experiments on induced immunity in plants.**—*Proc. roy. Soc.*, Ser. B., cxvii, 803, pp. 120–139, 3 pl., 1935.

The author gives a brief account of his discovery in the spring of 1933 of a strain of the yellow (aucuba) mosaic virus of tomatoes (Johnson's tobacco virus No. 6) [*R.A.M.*, xiv, pp. 261, 474, 535], which on tomatoes consistently produced a very faint mottle, typical of very mild 'winter' symptoms, with little leaf distortion or stunting of the plant, and also differed from the ordinary yellow mosaic virus in the symptoms caused by it on *Nicotiana glauca*, *N. glutinosa*, tobacco, *Solanum nodiflorum*, and *Zinnia* sp. Further studies gave evidence that this virus is a distinct strain and not an attenuated form of the other [cf. ibid., xiii, p. 649], since its virulence was not enhanced by repeated passage through susceptible plants, and there was also an indication that many of the anomalies now observed in symptom expression in host plants may probably be referred to the existence of hitherto unrecognized strains of the virus.

In special tests it was shown that preliminary inoculation of healthy host plants with one of the strains apparently completely immunizes them against infection with the other [loc. cit.]. Similar immunization experiments were performed with other tomato and tobacco viruses, the results of which indicated that four types of interaction between viruses may be distinguished, namely: (*a*) a virus may completely inhibit the development of another in the host tissues; (*b*) the second virus may multiply in the tissues without inducing typical disease symptoms; (*c*) the two viruses may multiply, each inducing symptoms typical of its specific disease; and (*d*) the effect of the second virus may be to intensify the severity of the disease symptoms induced by the single virus. The paper terminates with a brief discussion of the significance of these observations in relation to the multiplication of the virus in the host tissues. It is believed that there must be either only a few foci in the tissues at which the virus can multiply, or more probably, that there is in type (*a*) some reaction of the plant to the first virus infection which prevents the multiplication of the second.

Youden (W. J.), Beale (Helen P.), & Guthrie (J. D.). **Relation of virus concentration to the number of lesions produced.**—*Contr. Boyce Thompson Inst.*, vii, 1, pp. 37–53, 5 graphs, 1935.

A comparative study is made of the virus dilution curves published in the literature dealing with Holmes's local lesion method for the estimation of the active virus concentration [*R.A.M.*, xiv, p. 197] in extracts from *Nicotiana glutinosa*, *Phaseolus vulgaris* (Early Golden Cluster), and *Vigna sinensis* (Black Eye) experimentally infected with tobacco mosaic, ring spot, cucumber mosaic, and tomato aucuba mosaic [Johnson's tobacco virus No. 6: see preceding abstract]. It is claimed that these data are not inconsistent with the concept that the number of local lesions may be expressed in the form of the function $y=N(1-e^{-ax})$, in which y is the number of lesions obtained with any given concentration x of the virus, N represents the maximum number of lesions obtainable (possibly the number of susceptible areas available on the host leaves), e is the base for natural logarithms (2·718), and a is a constant representing a property of the virus preparation (assumed to be the average number of infective virus particles per susceptible area of the host leaf). Stated in another way, this function is what one would expect the curves to follow if the lesions resulted from a random distribution of virus particles on a number of susceptible areas, each receiving one or more particles forming a lesion. The method of evaluating the constants is also given, and their possible significance is discussed.

Pyke (E. E.). **Mycorrhiza in Cacao.**—*Rep. Cacao Res., Trinidad, 1934*, pp. 41–48, 3 figs., 1935.

Examination of cacao roots from different localities in Trinidad showed that an endotrophic mycorrhiza was present in most of the samples. In the simplest types the fungus had an external phase consisting of hyphae which ramified on the root surface, forming local, denser aggregates, where appressoria developed from which hyphae entered the epidermal cells and by intracellular growth traversed one or

more layers of the outer cortex. An extensive intracellular mycelium also developed in the cortex, consisting of coarse, non-septate hyphae coiled in a worm-like manner in the lumina of the cells. In the adjacent deeper layers the mycelium appeared, in sections, as branched, tree-like arbuscles.

Costantin [J.] & Magrou [J.]. **Étude des mycorhizes de la Pomme de Terre sur des pieds sains et sur des pieds atteints de mosaïque.** [Study of Potato mycorrhiza on healthy plants and on plants affected with mosaic.]—*Rev. Path. vég.*, xxii, 1, pp. 60–62, 1935.

The authors state that two virus-free potato varieties (Arran Victory and Bevelander) grown in 1934 at altitudes of 1,400 and 560 m., respectively, showed a normal and abundant development of mycorrhiza in their rootlets [cf. *R.A.M.*, xiii, p. 536], while the development of the symbiotic organism was very strongly inhibited in plants of the Eigenheimer variety affected with mosaic, which were grown at the same altitudes.

Romell (L. G.). **Ecological problems of the humus layer in the forest.**—*Mem. Cornell agric. Exp. Sta.* 170, 28 pp., 1 pl., 1935.

The author accepts P. E. Müller's two main types of humus layer, mull and mor, of which the former is stated to be ecologically the richer of the two, predominating in forests of broad-leaved trees in relatively mild temperate climates, whereas the latter extends through the belt of coniferous forests in the colder parts of the temperate zone. In pronounced mor types, the soil life is completely dominated by fungi, the fibres being woven together by roots and hyphae to form a tough mat. In mull, on the other hand, the fungus flora is relatively scanty, being largely replaced by bacteria. With few exceptions the fungi and bacteria of importance in mor and mull are unidentified. The nature of the decomposition proceeding in mull (bacterial) is quite different from that resultant on fungal activity in mor, acidity being produced only to a slight extent in the former but probably constituting a direct outcome of disintegration in the latter. Owing to the profusion of nitrogen-absorbing mycelia of mycorrhizal and other fungi in mor it is evident that the nitrogen level or average concentration of available nitrogen will be considerably higher in mull. The changes leading to the formation of one or other type and the ecological significance of the two types are discussed in some detail, while the application of the biological theory of their formation to silvicultural practice is briefly considered.

Carbone (D.) & Arata (Mlle M.). **Sul meccanismo dell' immunità acquisita nelle piante.** [On the mechanism of acquired immunity in plants.]—*Atti Congr. naz. Microbiol.*, 1934, pp. 138-145, 1935.

This paper dealing with certain histocytological aspects of plant immunity, with special reference to the defensive reactions of beans [*Phaseolus vulgaris*] inoculated through wounds with the 'toile' disease organism [*Botrytis cinerea*: *R.A.M.*, xiv, p. 188], is an Italian version of one already noticed from another source in French [ibid., xiii, p. 795].

Newton (W.) & Mayers (N.). **The physiology of Rhizoctonia solani Kühn. III. The susceptibility of different plants as determined by seedling infection. IV. The effect of a toxic substance produced by Rhizoctonia solani Kühn when grown in liquid culture, on the growth of Wheat, Carrots, and Turnips.**—*Sci. Agric.*, xv, 6, pp. 393–401, 2 figs., 1935. [French summaries.]

In tests carried out in British Columbia in which pot seedlings were grown in soil inoculated with *Rhizoctonia* [*Corticium*] *solani*, wheat [cf. *R.A.M.*, xii, p. 159], oats, red, crimson, and Mammoth White Dutch clovers were immune from or highly resistant to infection (as judged by lesions on the roots) [cf. ibid., vi, p. 748], lucerne [ibid., v, p. 19], sunflower [ibid., vi, p. 748] and perennial rye grass [*Lolium perenne*] resistant, and peas [ibid., xii, p. 671], beans [ibid., xiii, p. 725], vetch, buckwheat, and timothy [*Phleum pratense*] susceptible; turnips and carrots [ibid., xi, p. 97] were stunted, but showed no other symptom.

Further tests demonstrated that heat-sterilized filtrates of old liquid cultures of *C. solani* were much more toxic towards carrot and turnip than towards wheat seedlings. Hot water extracts of washed, dried and ground mycelium were toxic to turnips but not to wheat. The evidence obtained indicated that a heat-stable toxin is liberated by *C. solani* during growth and is also present in the mycelium.

Norman (A. G.). **Fungi for food.**—*Food Manuf.*, x, 4, pp. 129–131, 4 figs., 1935.

Attention is drawn to the potential uses of certain of the lower fungi, especially moulds, in the preparation of substances for human and animal consumption. *Aspergillus niger* is already used to produce citric acid on an industrial scale [*R.A.M.*, xii, p. 434 and next abstract], and *A. oryzae* is the source of the valuable taka-diastase [ibid., x, p. 559]. A very elaborate survey of fungal metabolic activities is stated to have been made by Imperial Chemical Industries, Ltd., and the work is being continued by Prof. Raistrick at the London School of Hygiene and Tropical Medicine [cf. ibid., xiv, p. 522]. In two foreign institutions, one in the United States (Wisconsin) and the other in Japan, studies are in progress on the actual composition of the fungi affording direct nutritive possibilities and on the conditions promoting the maximum yield of tissue. Chemical analyses of a large number of fungi grown on a liquid medium of glucose and inorganic salts, with nitrogen in the form of ammonium nitrate, showed the major groups of constituents to be present in the following approximate average proportions: protein 32 per cent., fats and lipoids 6, carbohydrates 58, and ash 5. Under favourable conditions the yield of fungal tissue amounts to about one-third of the sugar fermented; that is to say, from 10 lb. glucose about 3 lb. tissue could be obtained, about 1 lb. of which would be protein. The chief structural constituent of the lower fungi appears to be a form of chitin containing acetyl glucosamine, while carbohydrates are present in the form of glucose polysaccharides. Interest has latterly been aroused in the sterol group, the content of which in a large number of mould samples has been found to average 0·75 per cent. Mould tissue could therefore be used as a source of ergosterol, and if irradiated would be

potent in anti-rachitic (vitamin D) properties. Feeding trials on rats with mould tissue have shown that the addition of small quantities of dried yeast or casein is necessary to promote normal growth.

Horowitz-Wlassova (Mme L. M.) & Novotelnow (N. W.). **Zur Frage der Zersetzung der Pentosane und der Pentosen durch Mikroorganismen.** [A contribution to the problem of the disintegration of pentosans and pentoses by micro-organisms.]—*Zbl. Bakt.*, Abt. 2, xci, 22–26, pp. 468–481, 1935.

The capacity for hydrolysing pentosans was found in the writers' experiments with crushed sunflower husks and cotton seed from Leningrad oil mills to be marked in a group of moulds including *Aspergillus niger*, *A. oryzae*, and species of *Dematium*, *Penicillium*, and *Monilia*. Certain fungi, such as a species of *Sterigmatocystis* [*Aspergillus*], proved to be able to ferment the pentoses (especially xylose) thus formed with the production of organic acids, e.g., citric [see preceding abstract] and oxalic, a capacity shared by several groups of bacteria. Attention is drawn to the industrial possibilities of the expressed residues from oil mills, with their high pentosan content, in the production of various organic acids, including acetic, lactic, butyric, citric, and oxalic.

Mehrlich (F. P.). **Nonsterile soil leachate stimulating to zoosporangia production by Phytophthora sp.**—*Phytopathology*, xxv, 4, pp. 432–434, 1935.

This is a fuller account than that already published of the writer's experiments in the stimulation of zoosporangial development in *Phytophthora cinnamomi* and other species of *Phytophthora* causing pineapple heart rot in Hawaii by four days' culture on maltose-malt extract broth at 25° to 27° C., followed by washing in sterile distilled water and incubation at 21° to 25° in a non-sterile soil percolate [*R.A.M.*, xiv, p. 194]. The fact that the zoosporangia produced by *P. cinnamomi* under these conditions are papillate, in contrast to the non-papillate type described by other workers, suggests that the presence or absence of papillae is of doubtful taxonomic value.

Ziekten van Aardappelknollen. [Diseases of Potato tubers.]—*Versl. PlZickt. Dienst Wageningen* 9 (5th edn.), 20 pp., 4 pl., 1934. [Received June, 1935.]

In this revised version of a pamphlet previously issued in the same series, notes are given in popular terms on 28 different types of potato tuber rots or blemishes commonly observed in Holland [*R.A.M.*, viii, p. 400].

Loughnane (J. B.) & Clinch (Phyllis). **Composition of interveinal mosaic of Potatoes.**—*Nature, Lond.*, cxxxv, 3420, p. 833, 1935.

According to Koch and Johnson, a specimen of interveinal mosaic of potato received from the Albert Agricultural College, Glasnevin, Dublin, contained a 'streak' apparently identical with the 'potato streak virus' described by those writers from Madison, Wisconsin [*R.A.M.*, **xiv,** p. 523]. It had already been ascertained in the course of the Irish investigations in 1933–4 that the particular form of interveinal mosaic in

question results from the combined action of two different viruses, one of which may correspond to the American 'streak', since there is no evidence of a third constituent.

One component of interveinal mosaic is a virus of the X type having no known insect vector, while the other is selectively transmitted under certain conditions by *Myzus persicae*, and has been isolated both in this way and by passage through the Arran Crest variety, in which the X virus does not survive.

The virus separated by these methods sometimes produces on President foliage a slight, transient mottle, but in the cortex and pith of the tubers characteristic, irregularly distributed necrotic blotches; it is regarded as responsible for the latter symptom in interveinal mosaic. The virus, the exact identity of which remains to be established, appears to be related to, or identical with, that causing phloem parenchyma necrosis or pseudo-net necrosis [ibid., ix, p. 438 *et passim*].

Another diagnostic character of the virus is its capacity for combining with simple mosaic (virus X) and intensifying it to the interveinal form in a variety tolerant of both. Thus, the simple mosaic element alone would cause this symptom in Arran Crest, while the tuber blotch virus was presumably responsible for the streak produced by Koch and Johnson in the experimental Bliss Triumph, since the plants already carried the equivalent of simple mosaic.

The tuber blotch virus is readily inoculable into White Burley tobacco and *Datura stramonium*, but it is carried by the latter and probably also by the former. It does not survive nine days *in vitro* at room temperature, and unlike the X virus, does not pass the L3 or L5 Pasteur-Chamberland filters.

PUTNAM (D. F.). **The analysis of a complex mosaic of President Potato.**—Abs. in *Sci. Agric.*, xv, 6, p. 437, 1935.

The President variety of potato, known in Nova Scotia as Never Rot, has been observed for a number of years to suffer from a complex mosaic of which two of the three components appear to be identical with the veinbanding and mottle viruses [*R.A.M.*, xiv, p. 524] found in rugose mosaic, while the third, producing the typical yellow mottle associated with the disease, does not seem to have been previously reported. It belongs to the X group [ibid., xiv, p. 388], is filterable and transmissible by the sap of infected plants, but not by the aphid *Myzus persicae*, fairly resistant to ageing and chemical action, and has a thermal death point of about 72° C.

JONES (W.). **Soft rot of Potatoes caused by Pythium ultimum Trow.**—*Sci. Agric.*, xv, 6, pp. 402–410, 2 figs., 1935. [French summary.]

The soft rot of potatoes caused by *Pythium ultimum* [cf. *R.A.M.*, x, p. 54; xiv, pp. 259, 520] is stated to be fairly widespread in British Columbia, causing considerable losses especially after planting in spring. In artificial inoculation experiments infection was found to progress very rapidly at the optimum temperature for the growth of the fungus (25° to 31° C.), complete internal disintegration sometimes taking place within four days. The optimum hydrogen-ion concentration for the development of *P. ultimum* was found to lie between $P_H 6$ and 8.

None of the 15 standard varieties tested gave any evidence of resistance to infection. Mangel, beet, and carrot roots also proved susceptible to attack. Whole uninjured tubers did not contract infection when planted in soil inoculated with the fungus. A reduction in the incidence of infection was obtained by dusting the cut sets with sulphur followed by postponement of planting for 24 hours, and also by merely allowing the cut sets to form a callus in a humid atmosphere for 48 hours at room temperature. Freshly cut sets may become infected both in wet and very dry soils, the latter, however, being somewhat less favourable to the fungus than the former.

MEYER-BAHLBURG [W.]. **Phytophthora-Vorbeuge und Bekämpfung.** [*Phytophthora* prevention and control.]—*Dtsch. landw. Pr.*, lxii, 17, p. 208, 1935.

Although the writer states that some benefit in increasing resistance to potato blight (*Phytophthora*) [*infestans*: *R.A.M.*, xiv, p. 527] accrues from liberal applications of phosphoric oxide fertilizers, especially superphosphate, when combined with appropriate amounts of nitrogen and potash, control of this disease should be primarily by selection of resistant varieties. Among yellow-fleshed varieties may be specially mentioned the new Voran and Ackersegen, the latter having shown excellent blight resistance in the wet season of 1931. Ebstorfer Goldfink is another valuable yellow-fleshed variety, being well adapted to the lighter types of soil. Resistant white-fleshed varieties include Parnassia, P[ommersche] S[aat] G[esellschaft] Max Delbrück, Paulsens Hellena, and P. S. G. Gneisenau.

MADER (E. O.) & BLODGETT (F. M.). **Effects of modifications of the Potato-spray program.**—*Bull. Cornell agric. Exp. Sta.* 621, 34 pp., 1935.

The results [which are tabulated and fully discussed] of five years' spraying and dusting trials with Rural potatoes in western New York showed that the treatment profitably increased yields even in the absence of *Phytophthora infestans* [*R.A.M.*, xii, p. 653].

Maximum yields were given when the spray was applied at a pressure of 400 lb., using at least 116 galls. per acre per application. When as much material was applied at 400 as at 600 lb. pressure there was no significant difference in yield, and increasing the amount of material applied at 600 lb. (125 galls. per application) gave lower yields than those given by 116 galls. at the same pressure or even at 400 lb. The gain in yield at 400 lb. over 200 lb. pressure (averaging 38 bushels) per acre was large enough to make spraying at the higher pressure profitable. Economically the best results were obtained by using a mixture containing a total of 75 lb. copper sulphate per acre per season at 400 lb. pressure, this giving an increased yield over the unsprayed controls of 118·1 bushels per acre.

Spray schedules in which most of the copper was applied early in the season consistently gave higher yields than those in which it was evenly distributed throughout (average difference, 22·9 bushels per acre), and those in which heavy applications were made late (average difference, 31·1 bushels per acre).

One season's evidence indicated that when most of the copper was applied early, enough remained to prevent subsequent infection by *P. infestans*.

Comparison of Bordeaux mixtures made with different kinds of lime showed a slight difference in the average yields in favour of high-magnesium lime (finishing lime) [ibid., xii, p. 391].

Dusting at carefully selected times was as effective as spraying, though more copper (in the form of copper-lime dust) was required to obtain maximum yields than was used in the spray. With dusting also, additional gains resulted from applying much of the copper early and reducing the amount of lime.

SANFORD (G. B.). **On the merit of treating Potato tubers to reduce disease and loss caused by Rhizoctonia solani Kühn.**—Abs. in *Sci. Agric.*, xv, 6, p. 436, 1935.

The treatment of potato tubers in typical eastern Canadian and Alberta soils with effective mercuric chloride solution plus 10 per cent. by volume of hydrochloric acid entirely failed to prevent the transmission of *Corticium solani* to the stem 32 days after planting, from viable sclerotia on the sets, in 8 out of 11 tests [*R.A.M.*, xii, p. 530; xiv, p. 497], neither were significant results obtained from this method of disinfection in a single case where the data were based on total yield or yield of marketable tubers at harvest.

HOERNER (G. R.) & SMITH (D. C.). **A new canker of Hops in Oregon.**—*Phytopathology*, xxv, 4, pp. 437–439, 1 fig., 1935.

A hitherto unreported hop canker was observed in Oregon in June, 1934, affecting the internodes or sometimes the tips of untrained shoots, or more rarely the petioles. The cankers almost invariably developed where the shoots touched the soil, usually under exposure to sunshine. The disease appeared to be most prevalent on sandy soils. The shoot lesions developed as yellow to light brown areas, generally turning dark brown or nearly jet-black and reaching a length of several inches. Especially during bright, hot periods, the lesions often exude drops of a clear liquid that soon darkens and becomes more viscid. The cankered areas wilt and shrivel, causing the death of the shoot beyond the point of infection. Apparently pure cultures of bacteria were obtained on agar slants from the canker exudate. The hop varieties affected are Early and Late Clusters and Fuggles.

Report of the Puerto Rico Agricultural Experiment Station, 1934.—24 pp., 7 figs., 2 graphs, 1 map, 1935.

During the period under review, cuttings of the mosaic-resistant sugar-cane varieties Mayaguez 28 and 63 were issued to 95 farmers in Porto Rico, where the acreage sown to the former variety more than doubled [*R.A.M.*, xiii, p. 539]; in four localities it was the most widely planted variety. For eight years it has resisted mosaic even in fields adjoining infected cane. It developed, however, much rotten cane in late-cut 'gran cultura' [cane planted in summer or autumn and harvested at 16 to 18 months] in two localities and in first ratoons in a third,

and growers are again cautioned against extending this variety in 'gran cultura' on humid lowlands, particularly in areas of heavy rainfall.

OCFEMIA (G. O.). **Two rusts hitherto unreported on economic hosts from the Philippine Islands.**—*Philipp. Agric.*, xxiii, 10, pp. 880–885, 3 figs., 1935.

Brief descriptions are given of the symptoms and morphology of two newly detected rusts on economic plants in the Philippines, namely, *Uromyces musae* (determined by Ashby) on Halipo bananas and the aecidial stage of *Puccinia tubulosae* (determined by Arthur) on eggplant. The latter is stated by Arthur to have been collected in its uredo stage on *Digitaria* [*Panicum*] *sanguinale* in the Philippines in 1925. Both rusts are confined to the foliage, *U. musae* producing brown, elongated, raised uredosori, generally in rows of 10 to 12 mm. long, on the lower leaf surfaces of the banana, while on eggplant the orange, mucilaginous pycnidia of *P. tubulosae* occur in profusion on both sides, with relatively few aecidia. The damage caused by both fungi is considerable.

SERVAZZI (O.). **Intorno ad alcune Pestalotia.** [On some species of *Pestalozzia*.]—*Difesa Piante*, xii, 1, pp. 22–32, 4 figs., 1935.

In continuation of his earlier paper [*R.A.M.*, xiii, p. 598] the author gives further notes on the morphology, systematic position, and pathogenicity of a number of species of *Pestalozzia* isolated from ornamental plants in Italy, the records made including *P. palmarum* [ibid., xi, p. 780] on *Howea forsteriana*, *P. gracilis* on *Cryptocarya peumus*, *P. macrotricha* on *Kalmia latifolia*, and *P. funerea* on *Thuja occidentalis* [ibid., xiii, p. 598].

North Florida Experiment Station.—*Rep. Fla agric. Exp. Sta. 1933–34*, pp. 113–121, 5 figs., [1935].

In further soil temperature studies by L. O. Gratz and R. R. Kincaid under controlled conditions, the lowest temperature at which black shank (*Phytophthora parasitica nicotianae*) [*R.A.M.*, xiii, pp. 275, 806; xiv, p. 473] symptoms appeared in newly transplanted Round Tip tobacco within fifteen days after transplanting in infested soil was about 16° C. The optimum temperature for the development of the disease was about 27° or 28°, and the maximum about 34°. When several selections of wrapper tobacco of hybrid origin at Everglades showing promising field characters were planted in triplicate in 1/15 acre plots, less than 1 per cent. of the plants of each type had developed black shank wilt by the end of the priming season.

Plantenziekten waarmede rekening moet worden gehouden bij de keuring te velde van landbouwgewassen. [Plant diseases to which attention must be paid in the field certification of agricultural crops.]—*Versl. PlZiekt. Dienst Wageningen* 11 (3rd edn.), 12 pp., 8 pl., 1935.

Popular descriptions are given of the symptoms of certain diseases affecting the cereal, legume, flax, and beet crops in Holland with a view to facilitating their detection in the course of field certification work.